



**Metis Health Knowledge Authority
In Manitoba**

Cancer and Related Health Care Utilization in the Manitoba Metis Population

Winnipeg, Manitoba, Canada 2011



**Manitoba Metis Federation –
Health & Wellness Department in collaboration with
CancerCare Manitoba**

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Executive Summary

This report resulted from the need to further understand findings in the Metis Health Status & Health Services Utilization Study (also known as the Metis Atlas) (Martens, Bartlett, et al., 2010). In that study cancer was the leading cause of mortality for Metis¹ in Manitoba. The purpose of this report is to build on baseline information from the Metis Atlas to support the need of Region Knowledge Networks for more detailed information to guide assessment of Manitoba health programs and services. In Section 1 information on the project and methods of the research are presented. Section 2 offers insight into the Metis, the Manitoba Metis Federation, and the Health & Wellness Department. The Manitoba Metis Federation-Health & Wellness Department (MMF-HWD) conceptual model and approach to ways of knowing are described. In Sections 3 through 8, rates of all invasive, lung, colorectal, breast, prostate, and cervical cancers are reviewed, respectively. Incidence rates between groups are compared for the 1998-2007 time period, while trends over time are measured between 1993 and 2007. In Section 9 and Section 10 stage at diagnosis and treatment are reviewed, respectively, from 1998-2007 data. A Glossary is provided to further clarify terms.

The Research Team

The principal investigator (PI) on this study was **Dr. Judith G. Bartlett** an Associate Professor in the Department of Community Health Sciences in the Faculty of Medicine at the University of Manitoba, and an Adjunct Scientist with the Manitoba Centre for Health Policy (MCHP). Dr. Bartlett holds an MD, CCFP, and an MSc in Community Health Sciences. **Dr. Julianne Sanguins** is an Assistant Professor in the University of Manitoba's Department of Community Health Sciences, working on-site at the MMF-HWD. She is also Research Program Manager of the MMF-HWD. **Sheila Carter** is Assistant Director of the MMF-HWD. **Dr. Donna Turner** is an Associate Professor in the University of Manitoba's Department of Community Health Sciences and an Epidemiologist and the Provincial Director Population Oncology at CancerCare Manitoba (CCMB). **Dr. Alain Demers** during this study was an Assistant Professor in the University of Manitoba's Department of Community Health Sciences and an Epidemiologist and Epidemiology Team Leader at CCMB. **Dr. Erich Kliewer** is an Associate Professor in the University of Manitoba's Department of Community Health Sciences and an Epidemiologist at CCMB. **Punam Mehta** is the Chronic Disease Surveillance Program Coordinator in the MMF-HWD. **Nathan Hoepfner** is a Research Associate in the University of Manitoba's Department of Community Health Sciences, working on-site at the MMF-HWD. **Grace Musto** provided aggregated data as a Programmer/Analyst at CCMB. **Barbara Morgan** is Research Office Coordinator in the MMF-HWD.

¹ The Manitoba Metis Federation does not use the term 'Metis' with the accent ('Métis') as is done in some parts of Canada. In this report 'Métis' is used only when referring to sources that use the accented form.

The Manitoba Metis Federation

The Manitoba Metis Federation (MMF), founded in 1967, is the “democratic and self-governing body of the Manitoba Metis community” (www.mmf.mb.ca). The MMF strives to develop and maintain its capacity to ‘act collectively’ to successfully promote, protect, and advance the political, social, and economic interests of Metis in Manitoba. The MMF negotiates with provincial and federal governments to access funding to provide a wide range of programs and services. Within the MMF, the MMF-HWD was established in 2005. By using a Metis culture-based holistic health framework the MMF-HWD builds Metis health planning capacity, develops and implements a Metis health research agenda, and acts as a Metis health ‘expert authority’ to advise the health system.

Overview of Sections

Section 1 provides an introduction to the report and briefly reviews methods used for data generation in this study.

In Section 2 the reader is provided with an overview of the Manitoba Metis Federation, the MMF-HWD, and its holistic approach to knowledge development.

In Section 3 the proportions of all invasive cancers are reviewed. The proportions of all invasive cancers are found to be similar in All Metis compared to All Other Manitobans as well as in both males and females. Interestingly, Metis have a higher rate of all invasive cancers in Winnipeg. This higher rate is driven by higher rates in females. Provincially, Metis have an increasing trend compared to All Other Manitobans who have a decreasing trend. This increasing trend is particularly evident in Metis females in Rural South, Brandon, and Winnipeg aggregate areas.

Section 4 reviews lung cancer. Provincially, Metis have a higher rate of lung cancer compared to All Other Manitobans. This is also true for both males and females. In particular, Metis males in Rural South and Metis females in both Rural South and Winnipeg have higher rates. At the provincial level there are no trends in lung cancer for either Metis or All Other Manitobans; however, Metis males have an increasing trend in rates of lung cancer in Rural South aggregate area.

Section 5 contains results of colorectal cancer. There are no differences in rates of colorectal cancer between Metis and All Other Manitobans. Both groups show an increasing trend at the provincial level (in Winnipeg as well for Metis).

In Section 6 breast cancer in Manitoban females is presented. There are no differences in the rates of breast cancer between Metis females and All Other Manitoban females. However, at the provincial level Metis females demonstrate an increasing trend over the time periods surveyed.

Section 7 reviews prostate cancer. There are no differences in the rates of prostate cancer between Metis males and All Other Manitoban males. Both Metis males and All Other Manitoban males have a decreasing trend over time at the provincial level.

Rates of cervical cancer are reported in Section 8. There are no differences in the rates of cervical cancer in Metis females compared to All Other Manitoban females. Provincially, Metis females as well as All Other Manitoban females have a decreasing trend over time.

Cancer stage at diagnosis is the topic of Section 9. Overall, Metis and All Other Manitobans have the same distribution of cancer stage at diagnosis, with no significant differences between the two groups.

Finally, in Section 10, cancer treatment rates are reported. Overall, Metis with cancer are more likely to receive chemotherapy or radiation therapy compared to All Other Manitobans with cancer. However, there are no noticeable differences between types of treatment for specific cancers in Metis and All Other Manitobans. There are some possible trends worth noting. For all invasive cancers, Metis tend to have surgery as a cancer treatment in combination with chemotherapy and/or radiation more often, and appear to have cancer surgery alone less often than All Other Manitobans. For treatment of lung cancer, both Metis and All Other Manitobans tend to receive radiation alone more than the next two most common treatments: surgery alone and a chemotherapy/radiation combination.

Conclusion

While cancer is the leading cause of mortality in Metis in Manitoba (Martens, Bartlett, et al., 2010), the profile of cancer in Metis in Manitobans is little different than that of All Other Manitobans. While Metis have higher rates of lung cancer, rates of all invasive, colorectal, breast, prostate, and cervical cancers are similar between the two groups. Both show similar patterns of stage at cancer diagnosis as well as treatment for cancer. However, the elevated rates of lung cancer among Metis in Manitoba, and specifically in Winnipeg and Rural South aggregate area, may indicate a need for targeted smoking cessation programs for Metis. These and related results from the report will inform adaptation of health programs and services and be made widely available to key stakeholders.

Report available online at:

<http://health.mmf.mb.ca>

Section 1: Introduction & Methods

1.1 Background of this Report

Until recently little was known about cancer in Metis¹ in Manitoba. In order to support program and policy responses, health information related to cancer in Manitoba Metis is essential. This report provides an initial examination of this important health issue.

The ability to produce Metis-specific aggregate data resulted from the building of an anonymized ‘Metis population cohort’ during the previous Manitoba Metis Federation (MMF) research collaboration with the Manitoba Centre for Health Policy (MCHP) at the University of Manitoba. The MCHP-MMF research team produced the ‘Profile of Metis Health Status and Healthcare Utilization in Manitoba: A Population-Based Study’ (Martens, Bartlett, et al., 2010) - hereafter referred to as the ‘Metis Atlas’. Based on administrative data for Metis living in the province in 2006, the Metis Atlas was a benchmark document for Metis both nationally and in Manitoba. Historically there has been no other ‘whole population’ study available on the health of Metis, and very limited Metis-specific research has been conducted in Manitoba. The Metis Atlas revealed that cancer was the leading cause of mortality for Metis in Manitoba, followed closely by heart disease. These rankings were reversed for All Other Manitobans.

In ‘Cancer in Metis in Manitoba’ we set out to measure cancer rates and related health care use in Metis in Manitoba in order to affect changes in health service delivery and decision-making in our province. This report is the product of a partnership between the Manitoba Metis Federation’s Health & Wellness Department (MMF-HWD) and CancerCare Manitoba (CCMB). The MMF-HWD was formed in 2005 in order to undertake qualitative and quantitative academic research at both aggregate and community levels for the benefit of Metis in Manitoba. MMF-HWD works in partnership with academic researchers, service providers, as well as Metis citizens to ensure that research that will improve the health and wellness of Metis in Manitoba is both achieved and translated in methods that are relevant to the end-users.

The goal of CCMB is to reduce the burden of cancer in Manitoba through research, education, prevention, detection, and care (CCMB, 2011b). To achieve this goal researchers seek to identify patterns of cancer in our province. The collection, organization, and analysis of a variety of population-based cancer data is the mission of CCMB’s Department of Epidemiology & Cancer Registry.

The Manitoba Cancer Registry is one of the leading cancer registries in Canada and internationally. Registrars at the Manitoba Cancer Registry work to collect, classify, and maintain cancer information from pathology labs, clinics, and hospitals in Manitoba in support of cancer research, planning, prevention, and treatment. Cancer records include information related to the type of cancer, the place, date, and method of diagnosis, and specific details related to patient care and cancer treatment. Information is handled according to the criteria of the Manitoba Personal Health Information Act (CCMB, 2011c). The Manitoba Cancer Registry is a current holder of the North America Association for

¹ The Manitoba Metis Federation does not use the term ‘Metis’ with the accent (‘Métis’) as is done in some parts of Canada. In this report ‘Métis’ is used only when referring to sources that use the accented form.

Central Cancer Registries (NAACCR) Gold Standard for Registry Certification (CCMB, 2011a).

The existence of the anonymized Metis population cohort (housed in the MCHP) under the authority of the MMF allows for the production of ‘drill down’ studies. In this ‘drill down’ study we examine rates of all invasive cancers, as well as rates of five specific cancers, and cancer stage at diagnosis and treatment in Metis compared to All Other Manitobans. The outcomes of this report will inform decision-making regarding health service delivery in our province. ‘Cancer in Metis in Manitoba’ provides a comprehensive understanding of rates of cancer and cancer treatments for Metis in Manitoba.

1.1.1 *Cancer Definition*

Cancer is the term used for a collection of over 200 diseases involving the uncontrolled growth of abnormal cells in the body (CCMB, 2010; National Cancer Institute [NCI], 2010b). Cancer occurs when a specific type of cell in the body begins to grow abnormally, typically emerging from a pre-cancerous lesion developing into a malignant tumor (World Health Organization, 2009). Cancer is a physiological process that is classified clinically and occurs in stages, including tumour initiation, promotion, conversion, and progression (Shields & Harris, 1991).

We focused our study on five forms of invasive cancer – that is, cancers that have spread beyond the immediate site of origin and into surrounding tissue (CCMB, 2010). These include lung, colorectal, breast, prostate, and cervical cancers.

1.1.2 *Cancer Detection*

Cancer is usually detected by diagnostic procedures that test for the presence of abnormal cells and determine if they are malignant (cancerous) or non-malignant (non-cancerous). The two major types of tests are biopsies and imaging tests, although a biopsy is usually the only way to definitively conclude if cancer is present. In a biopsy a small piece of tissue is removed from the suspected cancer; a pathologist (a doctor who specializes in diagnosing diseases) examines the tissue under a microscope to determine if cancerous cells are present. Imaging tests, which can contribute to cancer diagnosis, produce pictures of areas inside the body; they include x-rays, mammograms, computed tomography (CT or CAT) scans, magnetic resonance imaging (MRI) scans, ultrasound, and positron emission tomography (PET) scans (Caring4Cancer, 2010).

1.1.3 *Cancer Stage at Diagnosis*

When cancer is diagnosed, staging tests help determine how far the disease has progressed. The specific cancer stage is defined by how large the cancer mass is and whether it has spread to neighbouring tissues, lymph nodes, and other parts of the body (Canadian Cancer Society [CCS], 2011a; Mitta, 2002). Staging is important as it allows physicians to determine the most appropriate treatment, to estimate an individual’s prognosis (chance of recovery), and to evaluate the treatment’s effectiveness (CCS, 2011; NCI, 2010a).

Launching its collaborative stage data collection system in 2004, CancerCare Manitoba’s Cancer Registry was the first in Canada to provide stage data on all cancer sites (CCMB, 2010c). In 2008 Manitoba was second only to Saskatchewan in percentage of all invasive cancer diagnoses including stage data (99.9% vs. 100.0%) in Canada (Canadian Partnership Against Cancer, 2010). Further information on cancer stage at diagnosis is included in Section 9.

1.1.4 *Cancer Treatment*

In this study those individuals who underwent surgery (excluding biopsies), had radiation therapy, and/or underwent chemotherapy are considered to have had cancer treatment (CCMB, 2010). Treatment plans are designed according to the unique context of each individual diagnosed with cancer (CCS, 2011b). Further information on cancer treatment is included in Section 10.

1.1.5 *Acronyms*

In this report several acronyms are used. In an attempt to minimize confusion the most commonly used are outlined below.

BSE – breast self-examination
 CCMB – CancerCare Manitoba
 DRE – digital rectal exam
 HPV – human papillomavirus
 ICD-O-3 – International Classification of Diseases for Oncology (3rd revision)
 MCHP – Manitoba Centre for Health Policy
 MLPF© -- Metis Life Promotion Framework©
 MPDB – Metis Population Database
 MMF – Manitoba Metis Federation
 MMF-HWD – Manitoba Metis Federation Health & Wellness Department
 PMR – premature mortality rate
 PSA – prostate-specific antigen
 RHA – Regional Health Authority

1.2 **Background of the Research Team**

In 2009 the MMF-HWD approached CCMB regarding the feasibility of linking the Metis Population Database with the Manitoba Cancer Registry to generate a report of cancer, cancer stage at diagnosis, and cancer treatment for Metis compared to All Other Manitobans. The MMF-HWD research team was responsible for all aspects of this study with the exception of producing aggregate data. Specifically the MMF-HWD selected each of the indicators examined in this study, prepared and analyzed the graphs, and wrote the text of the report. For consistency in working with the health sector, our report is structured similar to the Metis Atlas.

The principal investigator (PI) on this study was **Dr. Judith G. Bartlett**, an Associate Professor in the Department of Community Health Sciences in the Faculty of Medicine at the University of Manitoba, and an Adjunct Scientist with the MCHP. Dr. Bartlett holds an MD, CCFP, and an MSc in Community Health Sciences. She is also Director of the MMF-HWD and provides direction and oversight for all research. Dr. Bartlett was Co-Principal Investigator on the Metis Atlas as well as PI on several projects funded by the Canadian Institutes of Health Research. She is a part time clinician and an academic physician and scientific director with a strong understanding of and experience in public health administration.

Dr. Julianne Sanguins is an Assistant Professor in the University of Manitoba's Department of Community Health Sciences. Dr. Sanguins is an RN and holds a PhD in Nursing. Dr. Sanguins is also Research Program Manager in the MMF-HWD and was a

member of the Metis Atlas research team. Dr. Sanguins manages all aspects of the academic needs of the study, including directly supervising research staff.

Sheila Carter is Assistant Director of the MMF-HWD. Ms. Carter was a member of the Metis Atlas research team, providing expertise regarding health program and policy development. In this project, Ms. Carter was a member of the team from the project inception. She was also on the diabetes research team.

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Punam Mehta is the Chronic Disease Surveillance Coordinator in the MMF-HWD. Ms. Mehta holds an MSc in Community Health Sciences from the University of Manitoba and brings a background in epidemiology to the team.

Nathan Hoepfner is a Research Associate with the Department of Community Health Sciences in the Faculty of Medicine at the University of Manitoba, working on-site at the MMF-HWD. Mr. Hoepfner holds an MA in Canadian History.

Grace Musto is a Programmer/Analyst at CCMB. She provided aggregated data and statistical expertise for this report.

Barbara Morgan is the Research Office Coordinator in the MMF-HWD. Ms Morgan ensured HREB and HIPC approvals processes were followed, generated graphs and formatted the report.

We appreciate the role of the CCMB in this research project. Through a contractual arrangement, the CCMB generated the aggregate data and provided mentorship for the MMF-HWD research team in our effort to successfully complete our first cancer research study report.

1.3 Purpose of this Report and Outline of the Sections

The purpose of this report is to examine the following population-based indicators in order to answer several questions about the burden of cancer in the Metis in Manitoba:

- Rates of all invasive cancers
- Rates of five specific cancers
- Trends over time of five specific cancers
- Stage at cancer diagnosis
- Cancer treatments

For each indicator we asked: Is there a difference between Metis and All Other Manitobans:

- At the provincial level?
- Within each of the three ‘aggregated’ non-urban areas of Rural South, Mid and North, and selected urban areas of Brandon and Winnipeg?

A list of the sections included in this report is as follows:

Section 1:	Introduction and Methods
Section 2:	Overview of the MMF-Health & Wellness Department
Section 3:	All Invasive Cancers
Section 4:	Lung Cancer
Section 5:	Colorectal Cancer
Section 6:	Breast Cancer
Section 7:	Prostate Cancer
Section 8:	Cervical Cancer
Section 9:	Cancer Stage at Diagnosis
Section 10:	Cancer Treatment
	Glossary

1.4 What’s in the Report: The Types of Graphs, Tables, and Analyses

Section 1 provides an introduction to the report. Section 2 offers an overview of the Manitoba Metis Federation-Health & Wellness Department (MMF-HWD). Sections 3 through 8 have consistent formatting of information and contain one or more pie charts and bar graphs. Pie charts illustrate the relative proportion of five specific types of all invasive cancers in Metis and All Other Manitobans, either overall or by sex. There are two types of bar graphs used in this report: rate charts comparing incidence of cancer in Metis and All Other Manitobans living in the same geographical region, and trend charts comparing rates over three consecutive five-year time periods. Section 9 looks at stage at diagnosis for the five specific cancers in Metis and All Other Manitobans, while Section 10 provides information on treatment received by Metis and All Other Manitobans with cancer.

At the beginning of each section there is an Overall Key Findings sub-section which summarizes the main findings for Metis compared to All Other Manitobans. This is followed by rate and trending graphs. At the end of each section there are findings from the literature review that compare findings from our study with published data related to Metis health, with the results of this study in italics. However, you will note that for many of the indicators in our study there is little or no comparable research on cancer in Metis people in Manitoba. This report will add to the growing body of Metis-specific health information.

1.5 How to Read this Report

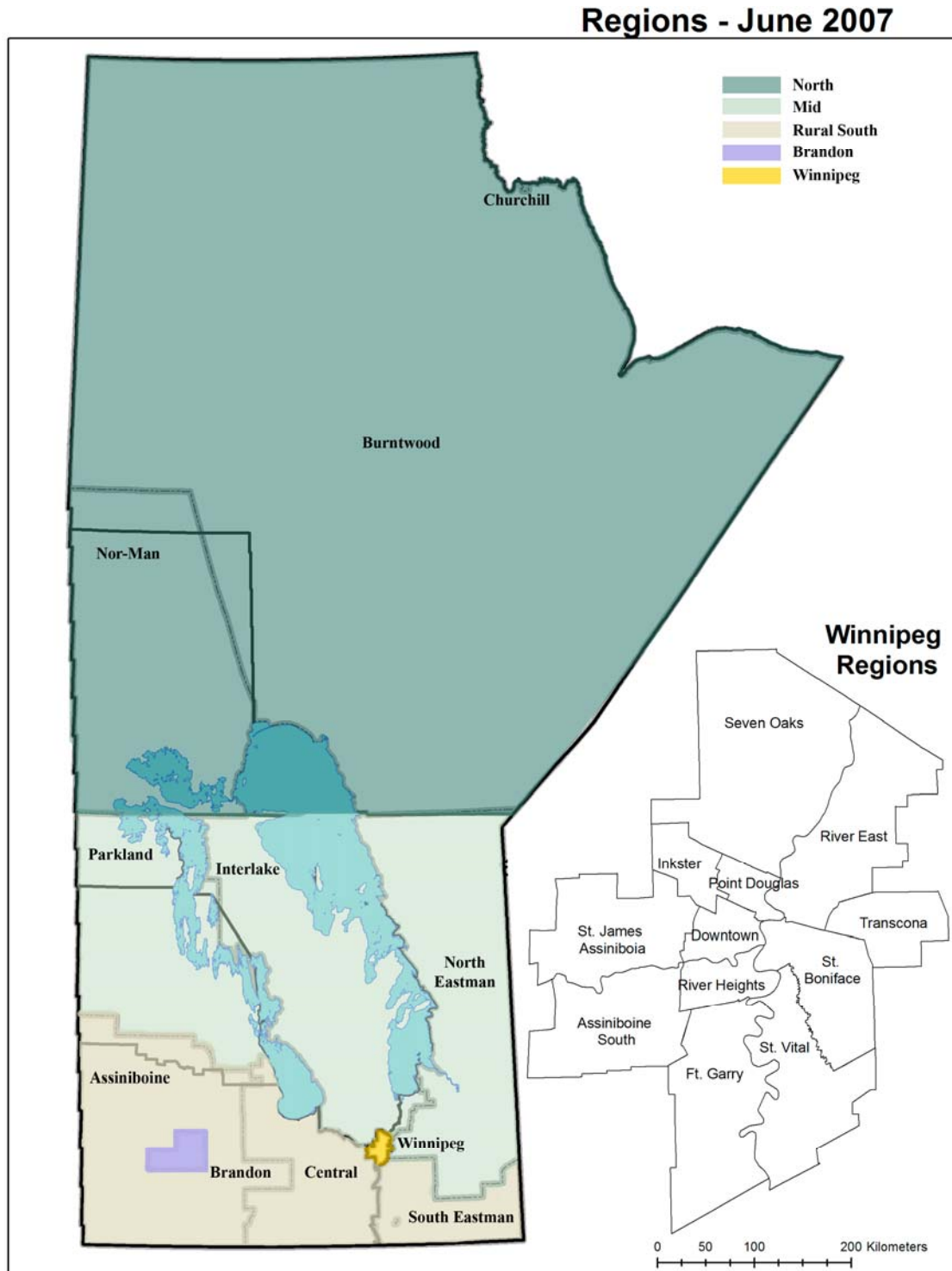
1.5.1 *Geographical Boundaries*

In this report health information for Metis and All Other Manitobans is compared at the provincial level and in the following aggregate geographical areas (with included Regional Health Authorities [RHAs] noted in parentheses):

- North (Churchill, Burntwood, and Nor-Man RHAs)
- Mid (Parkland, Interlake, and North Eastman RHAs)
- Rural South (Assiniboine, Central, and South Eastman RHAs)
- Brandon (Brandon RHA)
- Winnipeg (Winnipeg RHA)

Regional Health Authorities (RHAs) are aggregated in this way in order to ensure meaningful statistical comparisons between cancer incidence in Metis and All Other Manitobans. Cancer diagnosis is a relatively infrequent event in most populations, and Metis incidence rates in individual RHAs often resulted in insufficient numbers for analysis at that level. Figure 1.5.1 shows the aggregate geographical areas.

Figure 1.5.1: Map of Aggregate Geographic Areas



Source: Martens, Bartlett, et al., 2010

1.5.2 *Making Sense of the Graphs*

Proportion of all invasive cancers (pie charts): Pie charts show the relative proportion of five specific types of all invasive cancers in Metis and All Other Manitobans. These charts are included for Metis and All Other Manitobans, for Metis males and All Other Manitoban males, and for Metis females and All Other Manitoban females. In each of Sections 4 through 8, the relevant cancer in each pie chart is highlighted for ease of interpretation. Please note that the percent of all invasive cancers do not always add up to 100.0% due to rounding.

Incidence rates (bar graphs): Bar graphs depicting the age-standardized cancer incidence rates for Metis and All Other Manitobans over a single ten-year period (1998-2007) follow the pie charts. Ten-year incidence bar graphs compare Metis with All Other Manitobans, Metis males with All Other Manitoban males, and Metis females with All Other Manitoban females. Key observations of the findings related to each of the geographical boundaries are noted in the following order:

- 1) Differences between the two groups (e.g., Metis males and All Other Manitoban males)
- 2) Differences between the first group and the first group's provincial average (e.g., Metis males and the provincial average for Metis males)
- 3) Differences between the second group and the second group's provincial average (e.g., All Other Manitoban males and the provincial average for All Other Manitoban males)

Sample graph Figure 4.2.1 is from Section 4. The title shows the indicator measured (rates of lung cancer), the aggregate geographical areas shown (North, Mid, Rural South, and Brandon, and Winnipeg), the population measured (Metis and All other Manitobans) and the time period of measurement (1998/09-2006/07). The sub-title (in smaller font) describes the rate (incidence per 100,000 residents) and indicates if the data are age-standardized or based on crude numbers. The inset box in the top-right corner of the graph is the legend, which provides a breakdown of what the bar and dotted lines on the graph represent. The light grey horizontal bar represents the indicator rate for Metis whereas the black bar represents the indicator rate for All Other Manitobans. The light grey vertical dotted line represents the Manitoba provincial average for Metis whereas the black vertical dotted line represents the provincial average for All Other Manitobans.

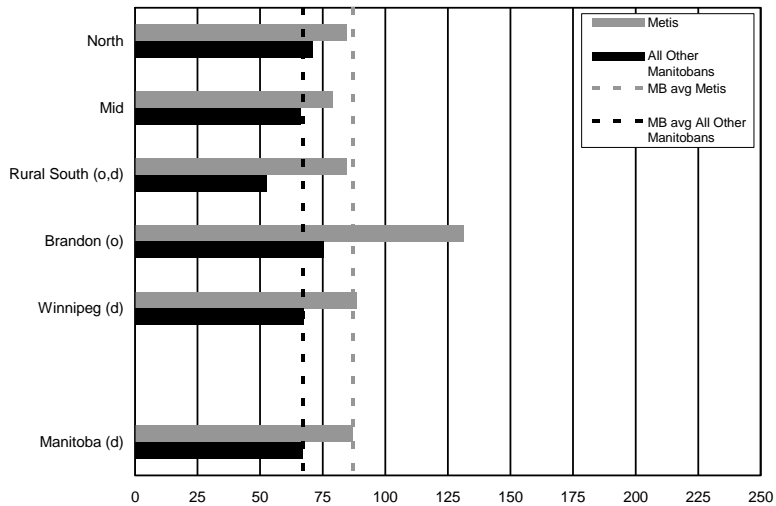
The letters 'm', 'o', 'd', and 's' represent a classification system developed by the MCHP and used extensively in other atlases. The use of these letters eases interpretation of data for each graph. As the key at the bottom of each chart notes:

- 'm' indicates the area's rate for Metis was statistically different from the provincial average for Metis
- 'o' indicates the area's rate for All Other Manitobans was statistically different from the provincial average for All Other Manitobans
- 'd' indicates the area's rate for Metis was statistically different from the area's rate for All Other Manitobans
- 's' indicates the data was suppressed due to small numbers

For example, in the chart to the right (Figure 4.2.1) you can see that Rural South aggregate area has the notation (o, d) beside it on the y-axis (left side) of the graph. According to the classification system the ‘o’ means that All Other Manitobans in Rural South are statistically different compared to the provincial average for All Other Manitobans. As the line for All Other Manitobans in

Figure 4.2.1: Rates of Lung Cancer by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Rural South is shorter than the provincial average line for All Other Manitobans, we can conclude that All Other Manitobans have a statistically lower rate of lung cancer compared to the provincial average for All Other Manitobans. The ‘d’ refers to the fact that Metis in Rural South are statistically different from All Other Manitobans in the same area. As the line for Metis is longer than the line for All Other Manitobans we can conclude that Metis in Rural South have a higher rate of lung cancer compared to All Other Manitobans in Rural South. There is no ‘m,’ so we can conclude that there is no statistical difference between the rates of lung cancer in Metis in Rural South compared to the provincial average for Metis.

Unless otherwise indicated any mention of ‘lower’ or ‘higher’ in this report refers to results that are statistically significant. Statistical significance is a term commonly used throughout this report. It means that we can be 95% certain that the difference between the two comparison groups is due to a real difference and not due to random variation in the populations (Springer-Verlag, 1995).

Trends (bar graphs): Following the ten-year incidence rate bar graphs is another set of bar graphs which illustrate possible trends in cancer incidence. Three five-year time periods are included – 1993-1997, 1998-2002, and 2003-2007 – though only the earliest and most recent periods were compared for statistical significance. Each trend bar graph shows information for only one group (Metis, All Other Manitobans, Metis males, etc.). Again, key observations of the findings related to each of the geographical boundaries are noted, but this time within each group:

- 1) Incidence trends in Metis and All Other Manitobans
- 2) Incidence trends in Metis males and All Other Manitoban males
- 3) Incidence trends in Metis females and All Other Manitoban females

On the following page is another sample graph (Figure 4.3.3) from Section 4 – this time looking at trends in lung cancer incidence in Metis males. Again the legend in the inset box in the top-right corner of the graph shows what the bar lines on the graph represent – this

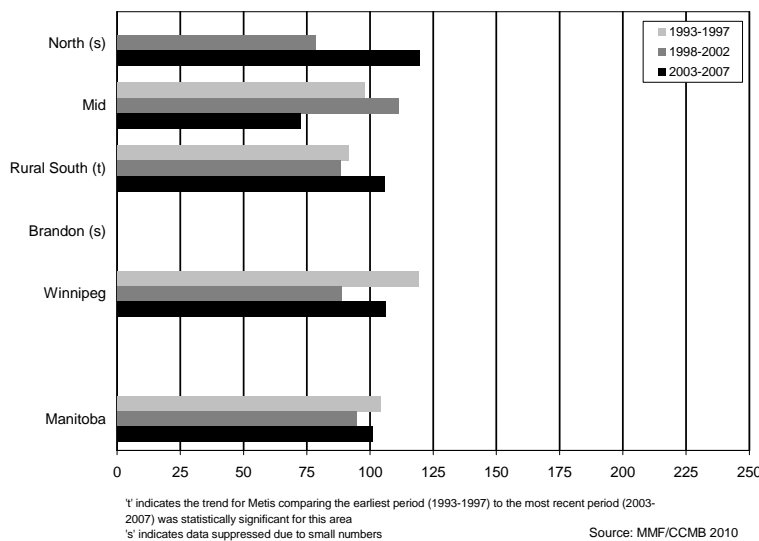
time the three time periods: 1993-1997 (light grey), 1998-2002 (dark grey), and 2003-2007 (black). There are no dotted vertical lines to indicate provincial averages in the trend graphs.

There are only two letters in the classification system for trend graphs:

- ‘t’ indicates the area’s rates have a statistically significant increasing or decreasing trend
- ‘s’ indicates the data was suppressed due to small numbers

In Figure 4.3.3 below you can see that Rural South aggregate area has the notation (t) beside it on the y-axis (left side) of the graph. According to the classification system this ‘t’ means that Metis males in Rural South aggregate area have a significant trend in lung cancer incidence over time.

Figure 4.3.3: Rates of Lung Cancer in Metis Males by Aggregate RHA and Time Period
 Five-year average age-standardized incidence rates per 100,000 residents



Looking at the graph, we can see that the 1993-1997 (light grey) bar is slightly longer than the 1998-2002 (dark grey) bar but much shorter than the 2003-2007 (black) bar. This tells us that in Rural South there is an increasing trend for Metis males when comparing the earliest and most recent time periods: 1993-1997 and 2003-2007.

You can also see in the chart above that there is

an (s) beside both North aggregate area and Brandon RHA. Since only one bar is missing from North aggregate area (the light grey bar: 1993-1997), we know that this information must be suppressed due to small numbers (i.e., there were five or fewer – but not zero – individuals with lung cancer in North aggregate area in that period of time). Neither area has a (t), so even though the bar for 1998-2002 in North is much shorter than the bar for 2003-2007, we are not confident that this increase indicates a statistically meaningful trend towards higher rates of lung cancer in Metis males in North aggregate area.

Unless otherwise indicated any mention of an ‘increasing’ (or ‘upward’) or ‘decreasing’ (or ‘downward’) trend in this report refers to results that are statistically significant. We can be 95% sure that the increasing or decreasing trend we see is a real trend and not simply due to random variation in the area.

1.6 Methods Used in This Report

Population-based health research is the cornerstone of public health research. It provides information related to patterns of health and illness in a population, and is used to inform evidence-based decision-making around disease treatment and service delivery (Gordis, 1996).

Our report is a population-based research study. As Martens, Bartlett, et al. (2010) note, this means several things:

- 1) Data are based on every person living in Manitoba who had a provincial health card during the time period measured, and include all people living in Manitoba's First Nation communities.
- 2) Information is based on where you live and not where you go for treatment. This provides greater accuracy when comparing the health issues and health care utilization of people living in particular communities.
- 3) Rates are not based upon smaller "samples," but rather the entire population fitting these criteria – hence "population-based."

It is important to note that for some indicators the data are based on a small number of individuals. In some cases suppression could not be avoided due to the relative rareness of the condition or event.

In our study, data were coded to protect the identification of study participants. All data used in this study come from an administrative database with identifying information of both patients and health care providers removed. In addition, there was no contact with patients or providers during any part of this study. The intent of these analyses was to examine patterns amongst groups based on Metis ethnicity and on different geographical divisions. No individual-level data are presented as part of this study (Martens, Bartlett, et al., 2010).

For the purposes of this particular study we obtained approvals from the Manitoba Metis Federation to access the Metis Population Database, the Faculty of Medicine's Research Ethics Board at the University of Manitoba for approval of our research design and activities, and the Manitoba Government's Health Information Privacy Committee to access the Population Health Research Data Repository and to ensure confidentiality of information.

1.7 Data Sets Used in This Research

The data sources used in cancer surveillance and research are often limited to existing secondary data sources such as administrative data – that is, data that are collected for a purpose other than research (e.g., physician billing records). This report utilized anonymized data from the following sources:

- Metis Population Database (Manitoba Centre for Health Policy)
 - To link with the Manitoba Cancer Registry to identify cancers in the Metis population and to generate the denominator for Metis rate calculations
- Manitoba Health coverage file (Manitoba Health)
 - To generate the denominator for All Other Manitoban rate calculations

- Manitoba Cancer Registry (CCMB)
 - To identify cancer cases in Metis and All Other Manitobans and to look at treatment patterns, stage at diagnosis, and geographical distribution of cancer in both groups

1.8 How the Cohort was Created

The Metis Population Database (MPDB) is an anonymized dataset including encrypted health information for a total of more than 73,000 Metis of all ages in Manitoba (Martens, Bartlett, et al., 2010). The MPDB includes Manitoba Metis identified from three sources – the MMF membership list, the Canadian Community Health Survey (CCHS), and the National Population Health Survey (NPHS) – in addition to the children and both parents of these individuals (Martens, Bartlett, et al., 2010). When developing the cohort for this study, however, the segment of the population identified through the CCHS and NPHS (including children and parents matched to these individuals) were not included. This segment added only about 2% to the population, half of whom would be under the age of twenty. Thus, it was determined that not including this relatively small group in the Metis cohort for our study would have no significant effect on our analysis; they were included instead in the All Other Manitobans cohort.

The MPDB was developed to provide a baseline for further data linkage research such as this cancer study. The MMF put in place a data sharing agreement with the MCHP to house the MPDB under full MMF Ownership, Control, Access, and Stewardship (OCAS) principles. A series of letters of understanding were signed to ensure the protection of movement of data and to identify terms for destruction of data resulting from this linkage. Once these letters were signed, the MPDB was transferred from the MCHP to Manitoba Health. At Manitoba Health the MPDB was linked to personal health numbers, which were encrypted in a way to be recognizable by CCMB's database. The new dataset was transferred to CCMB and the research team at CCMB linked that dataset with CCMB's cancer registry in order to identify cancer in the Metis population. The same process was carried out for the All Other Manitobans comparison group using Manitoba Health's coverage file. These processes produced a total of 3,461 cancers diagnosed in the Metis population and 78,761 diagnosed in the All Other Manitobans population.¹

1.9 Data Production and Analysis

Age-standardized rates were calculated by the CCMB research team using the direct method of standardization, with the 2001 Manitoba population as the standard population. Single-period incidence rates were calculated over a ten-year period (1998-2007), while linear trends were calculated comparing the earliest (1993-1997) and most recent (2003-2007) five-year time periods. However, three five-year time periods (1993-1997, 1998-2002, and 2003-2007) are included in the trend charts to provide a more comprehensive view of changing incidence rates over time.

¹ These numbers do not mean that 3,461 Metis individuals (and 78,761 All Other Manitoban individuals) were diagnosed with cancer. Some individuals will have received a cancer diagnosis more than once in the period measured.

In this report some rates are cited for both sexes combined and for males and females individually (all invasive, lung, and colorectal cancers), while others are for only one sex (breast, cervical, and prostate cancers).

1.10 Data Interpretation

Between the MMF team and the CCMB team there was a systematic collaborative process used for review of every graph for each indicator used in our study. The review process involved three steps: review for scientific integrity (data processing), review to ensure the context of the data was captured, and final review to describe each graph in point form.

1.11 Limitations

There are several limitations to this study. First, the administrative data on which it is based comes from reports from pathology laboratories, clinics, and hospitals in Manitoba, and will not include every cancer case in Manitoba – only those seen in the medical system. It can be confidently stated, however, that these cases represent the vast majority of those in Manitoba, as the Manitoba Cancer Registry is one of the leading cancer registries both in Canada and worldwide. Second, the analysis in this report is sometimes based on very small numbers of cases. This limits the effectiveness of the analysis both in detecting meaningful differences between the Metis and All Other Manitobans populations (especially for less common cancers such as cervical cancer) and in detecting trends over time within the Metis or All Other Manitoban populations. Third, as noted several times in this report, the analysis of trends in cancer incidence for Metis and All Other Manitobans is based on comparisons between only two of the three time periods: the first (1993-1997) and last (2003-2007) periods. The second (1998-2002) time period is included for context, but is not part of the statistical analysis. Finally, comparisons in this report between our data and data from the CCS have two inherent limitations: the standard population for CCS reports is different than that used in CCMB studies (including this one), and data from the Canadian Cancer Statistics publication is reported according to international (IARC/IACR) rules that are slightly conservative relative to the approach used by the Manitoba Cancer Registry. The international rules tend to assign only one tumour per person and will slightly undercount the burden of cancer, compared to the standard set of Canadian coding rules used by the Manitoba Cancer Registry.

1.12 Summary

Before the release of this report, incidence of cancer in Metis in Manitoba was largely unknown to community members, researchers, policy makers, and health providers. ‘Cancer in Metis in Manitoba’ offers current and reliable information to inform these key stakeholders in Metis health about the number one cause of mortality in Metis people. Working in collaboration, we can improve the picture of health and wellness for Metis in Manitoba.

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Section 2: Overview of the MMF-Health & Wellness Department

Authors: Dr. J. G. Bartlett and Ms. S. Carter

2.1 Introduction

The Manitoba Metis Federation-Health & Wellness Department (MMF-HWD) undertakes Metis-specific health research along with a province-wide process to enhance the use of this research. This section provides an overview of the Metis, the Manitoba Metis Federation (MMF), highlights of the MMF-HWD's use of a Metis-specific lens, and Knowledge Networks. A more complete discussion of the details touched upon in this section can be found in Chapter 2 of the Metis Atlas (Martens, Bartlett, et. al., 2010).

2.2 The Metis

The Metis are descendants of early 17th-century relationships between North American Indians and Europeans (Sprague & Frye, 1983). The Metis coalesced into a distinct nation in Manitoba in the late 18th century. After the 1885 fall of Batoche “Metis were denied a separate identity and ignored for a century” (McMillan, 1995, pp. 312-313). By 1967, with the formation of the Manitoba Metis Federation, the Metis in Manitoba were again asserting their capacity to advocate and function once more in a collective manner. In the 1982 amendment to the Canadian Constitution Metis were named as one of the three Aboriginal peoples of Canada (Government of Canada, 1982).

The Metis make up 33% of Aboriginal peoples in Canada, numbering 389,785 in 2006 (Janz, Seto, & Turner, 2009). More than 18% of Metis in Canada live in Manitoba, with over 10% in Winnipeg alone (Statistics Canada, 2008). The Metis are also the fastest growing Aboriginal group in Canada, with an increase in population of 91% between 1996 and 2006 (Statistics Canada, 2008). Increased rates of self-identification are partially responsible for this change in demographic. According to Statistics Canada data, between 1996 and 2006 the number of self-identified Metis in Manitoba increased from 40,720 to 71,805, representing an increase of 76% (Martens, Bartlett, et al., 2010).

The Metis Atlas (Martens, Bartlett, et al., 2010) reported that in 2006 almost half (46.5%) of Metis in Manitoba lived in the urban areas of Winnipeg and Brandon. They noted that the 2006 Metis population was younger than that of All Other Manitobans, with 25.4% of the population less than 15 years of age (compared to 19.1% of All Other Manitobans). Only 9.1% of the Metis population was 65 years of age or older compared to a rate of 13.9% in All Other Manitobans.

2.3 The Manitoba Metis Federation

The Manitoba Metis Federation website (2010) documents that to be an Individual Member or Child Member ⁴ of the Manitoba Metis Federation you must:

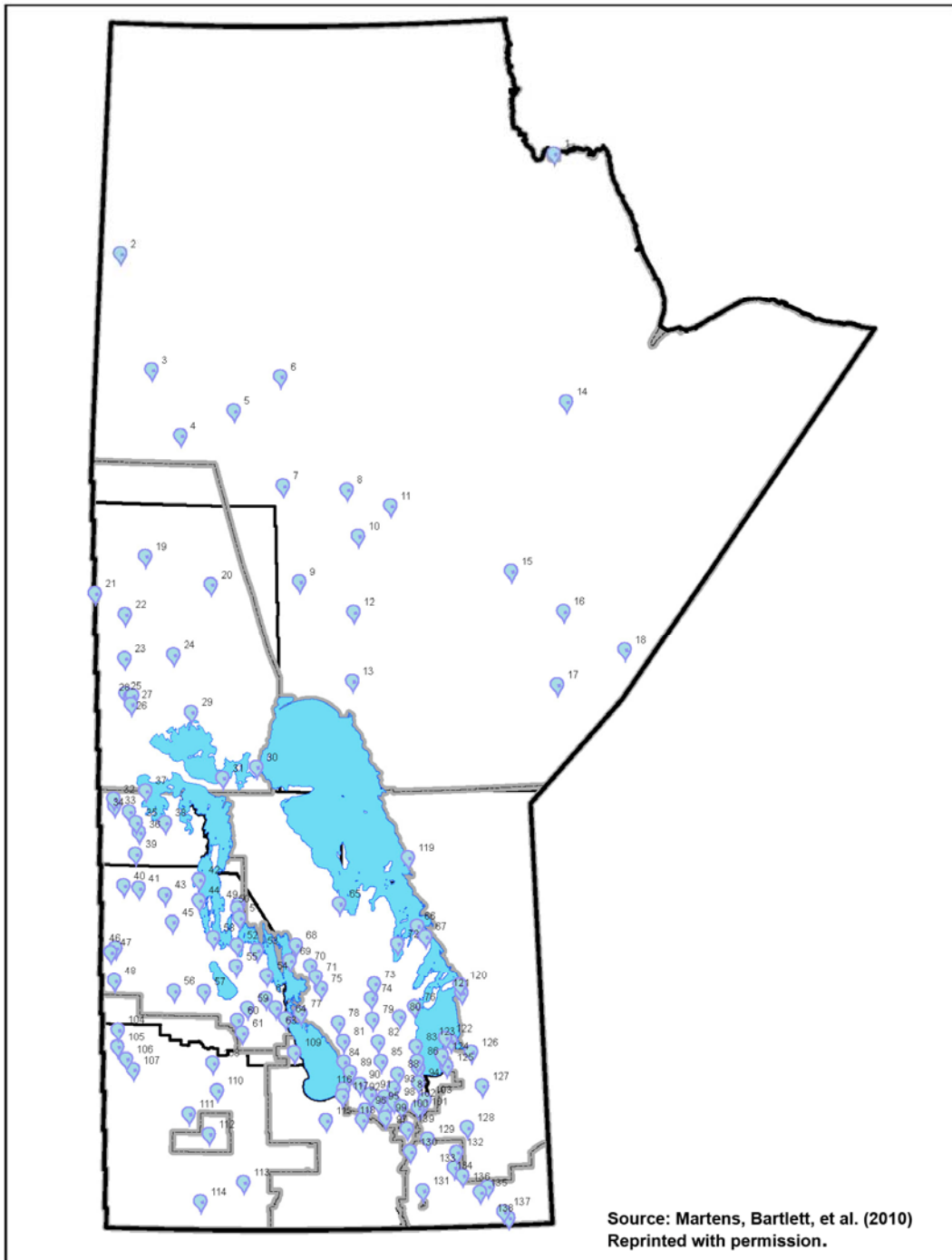
- 1) Self-identify as Metis
- 2) Show an ancestral connection to the Historic Metis Community
- 3) Be accepted by the contemporary Metis Community

For 43 years, the MMF has ‘acted collectively’ to promote, protect, and advance the political, social, and economic interests of Metis citizens in Manitoba. The MMF negotiates with governments to access funding for programs and services better able to meet Metis citizens’ cultural norms. Metis citizens live in 139 villages, towns, cities and unorganized territories (See Figure 2.3.1) across Manitoba.

Twenty-one Representatives and a President are elected as the MMF Governing Body every four years. The MMF has seven Regions and a Home Office, along with a number of associated subsidiaries and affiliations. The MMF Governing Body leads, manages, and guides the strategic direction, objectives, and policies of the Federation and its subsidiaries. The President is the Chief Executive Officer, leader, and MMF spokesperson. The MMF has an Executive Director responsible for overseeing the day-to-day operations of the Federation. Each Region is administered by an elected Vice President and two elected Directors.

⁴ ‘Child Member’ is a new addition by majority vote on a Resolution at the 2009 MMF Annual Assembly.

Figure 2.3.1: Villages, Towns, Cities, or Unorganized Territories Where Metis Live in Manitoba, 2009



Code Key for Villages, Towns, Cities, or Unorganized Territories: In Regional Order

Thompson Region		San Clara	47	Warren	95
Churchill	1	Roblin	48	Marquette	96
Brochet	2	Mallard	49	Grosse Isle	97
Lynn Lake	3	Rock Ridge	50	Stonewall	98
Granville Lake	4	Waterhen	51	Rosser	99
Leaf Rapids	5	Spence Lake	52	Stony Mountain	100
South Indian Lake	6	Crane River	53	Lockport	101
Nelson House	7	Cayer	54	St. Andrews	102
Thompson	8	Rorketon	55	Selkirk	103
Wabowden	9	Gilbert Plains	56	Southwest Region	
Thicket Portage	10	Dauphin	57	Russell	104
Pikwitonei	11	Winnipegosis	58	Binscarth	105
Cross Lake	12	Ste. Rose	59	St. Lazare	106
Norway House	13	Laurier	60	Birtle	107
Gillam	14	McCreary	61	Erickson	108
Oxford House	15	Eddystone	62	Amaranth	109
Gods Lake Narrows	16	Bacon Ridge	63	Minnedosa	110
Garden Hill	17	Kinosota	64	Rivers	111
Red Sucker Lake	18	Interlake Region		Brandon	112
The Pas Region		Dauphin River	65	Belmont	113
Sherridon	19	Matheson Island	66	Boissevain	114
Snow Lake	20	Pine Dock	67	Portage la Prairie	115
Flin Flon	21	Fairford	68	St. Ambroise	116
Cranberry Portage	22	Steep Rock	69	St. Marks	117
Wanless	23	Grahamdale	70	St. Eustache	118
Cormorant	24	Moosehorn	71	Southeast Region	
Umpherville	25	Fisher Bay	72	Berens River	119
Big Eddy Settlement	26	Hodgson	73	Seymourville	120
Young Point	27	Fisher Branch	74	Manigotagan	121
The Pas	28	Ashern	75	Victoria Beach	122
Moose Lake	29	Riverton	76	Traverse Bay	123
Grand Rapids	30	Vogar	77	Grand Marais	124
Easterville	31	Eriksdale	78	Beaconia	125
Red Deer Lake	32	Poplarfield	79	Powerview	126
Barrows	33	Arborg	80	Lac du Bonnet	127
Baden	34	Lundar	81	Ste. Rita	128
Mafeking	35	Narcisse	82	Lorette	129
Bellsite	36	Gimli	83	St. Adolphe	130
Dawson Bay	37	Oak Point	84	St. Malo	131
Pelican Rapids	38	Inwood	85	Richer	132
Birch River	39	Winnipeg Beach	86	La Broquerie	133
Northwest Region		Matlock	87	Marchand	134
Swan River	40	Teulon	88	Woodridge	135
Minitonas	41	St. Laurent	89	St. Labre	136
Duck Bay	42	Lake Francis	90	Vassar	137
Cowan	43	Woodlands	91	South Junction	138
Camperville	44	Argyle	92	Winnipeg Region	
Pine River	45	Balmoral	93	Winnipeg	139
Boggy Creek	46	Petersfield	94		

2.4 Manitoba Metis Federation-Health & Wellness Department

The MMF-Health & Wellness Department (MMF-HWD) was created in July 2005 as a Metis-specific ‘health knowledge authority.’ Over time it has solidified a vision of ‘a well Metis community’ with its mission of ‘creating and facilitating the use of knowledge’ to contribute to improving Metis health status. The MMF-HWD is focused on four main strategies intended to move department activity toward its vision. These include:

- Using a Metis culture-based holistic wellness framework
- Building Metis health planning capacity
- Implementing a Metis health research agenda
- Developing as a Metis ‘Health Knowledge Authority’ to advise the health system

For the MMF-HWD, the Metis Atlas was ‘the’ base research setting the stage for a range of new research and related activities intended to positively impact the health and wellbeing of Metis citizens in Manitoba. The anonymized (no names) Metis Population Database (MPDB), created during production of the Metis Atlas is housed in the Manitoba Centre for Health Policy (MCHP) under a data sharing agreement that ensures MMF Ownership, Control, Access, and Stewardship (OCAS). This maximizes privacy protection for Metis citizens. As well, the MMF has developed a stringent process for use of the MPDB in new projects, whether by its own MMF-HWD researchers or other university-situated researchers. The MPDB enabled aggregated data for this ‘Cancer in Metis in Manitoba’ study to be generated.

2.5 Description of a Culturally Coherent Metis ‘Methodology’ or Lens for Wellness

2.5.1 *Ways of Knowing*

The MMF-HWD approaches all departmental activities from a Metis-specific Methodology (that is, a Metis perspective or lens). This Metis lens is rooted in the integration of our historic Indigenous and European ancestries to become a uniquely Metis ‘way of knowing’. Adapted from work by Burton-Jones (1999), the MMF-HWD considers the inclusion of both ‘ways of knowing’ as appropriate for Metis. This Metis ‘way of knowing’ is holistic, including: Narrative (our story, spiritual); Experience (our experience, emotional); Data (our research, physical); and Information (our synthesis of the first three, intellectual). This simple approach is used to demystify research (Figure 2.5.1), and to envelop our strategies (Figure 2.5.2).

Figure 2.5.1: Holistic Research Process

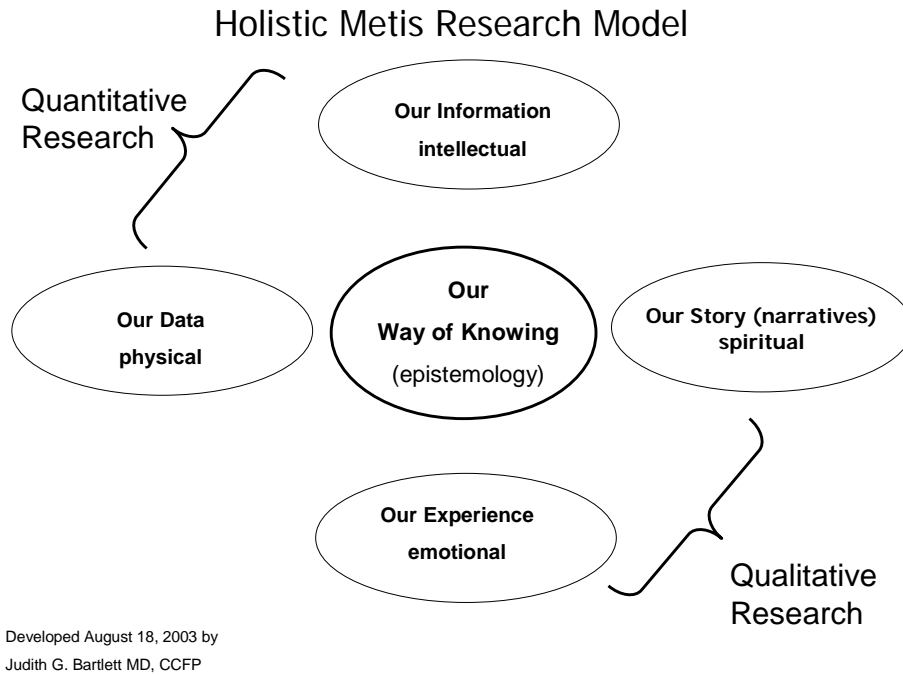


Figure 2.5.2: MMF-HWD Strategies



The MMF-HWD adapted a holistic framework originally developed for use in an urban Aboriginal community health centre (Bartlett, 1995). The framework was renamed the Metis Life Promotion Framework© (MLPF©) for use with Metis. The MLPF© includes finding ‘balance’ among 16 important areas that help to ‘determine how our life unfolds’ [*spiritual, emotional, physical, and intellectual; child, youth, adult, or elder (senior); individual, family, community, and nation; cultural, social, economical, and political*] (i.e. 16 Determinants of Life (Figure 2.5.3)). It is critical to keep in mind that the MLPF© is a tool for holistically organizing thoughts and information – it does not ‘represent’ Metis culture.

Figure 2.5.3: Metis Life Promotion Framework© Determinants of Life©

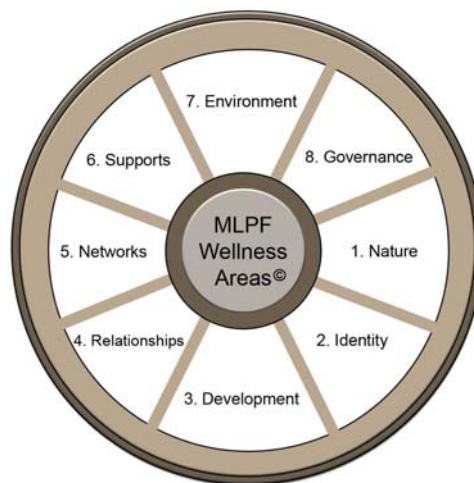
Health can be considered a balance of:



Developed by Judith G. Bartlett MD, MSc, CCFP

In 1996, the framework was adapted to consider ‘Wellness’ (Bartlett, 2004). The 16 ‘Determinants of Life’ were grouped as eight Wellness Areas©, which made it easier to think about the determinants for health planning and interpretation of research findings. MLPF© Wellness Areas© naturally flow around the spokes of a Red River cart, representing constant motion and change (Figure 2.5.4).

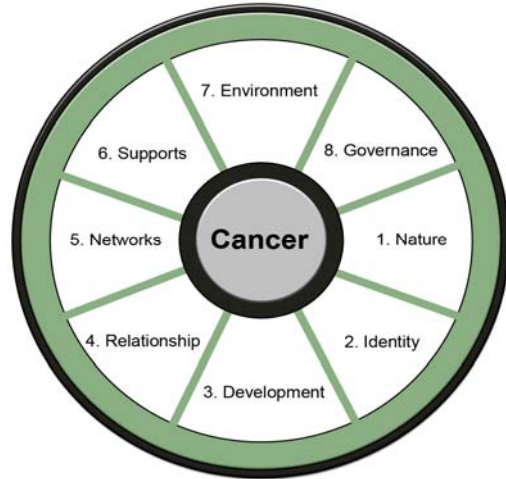
Figure 2.5.4: Wellness Areas©



Developed by Judith G. Bartlett MD, MSc, CCFP

Although not explicitly an accepted Metis lens, this tool allows every person engaged in Metis-related health planning to undertake a process where they learn ‘how to create’ Wellness Areas based on their own life experience. The Wellness Areas can be used for individuals, families, or groups as well as distinct diseases. Figure 2.5.5 illustrates the use of Wellness Model for those with cancer. Table 2.5.1 demonstrates the types of questions individuals would be asked about their own experiences.

Figure 2.5.5: Wellness Model for Examining Cancer



- Approaching diseases from a wellness perspective
- Needs to occur at both policy & program levels

Developed by Judith G. Bartlett MD, MSc, CCFP

Table 2.5.1: Wellness Areas© Question Type

WELLNESS AREA©	QUESTION: How does cancer affect my:
Nature	sense of who I really am as a person?
Identity	experience of how others see me or how I want others to see me?
Development	sense of age/ability to express the child, youth, adult, and elder parts of me?
Relationships	ability to respect and care for others?
Networks	ability to interact with others?
Supports	body, ability to work and be involved in community?
Environment	cultural, social, economic, and political influence?
Governance	ability to choose my destiny and future?

2.6 Knowledge Translation

Knowledge Translation (KT) essentially means using *'what we know'* from research to influence *'what gets done'* in health/social programs/services in order to improve health. Using KT for the 'Cancer in Metis in Manitoba' maximizes benefit for Manitoba Metis citizens. The MMF-HWD existing Knowledge Network (KN) 'discussion tables' (Table 2.6.1) will examine the Metis health information in this report. For a more detailed description of this process see Chapter 2 in the Metis Atlas (Martens, Bartlett, et. al., 2010).

Table 2.6.1: Knowledge Networks-Association of MMF Regions with RHAs

Region Knowledge Networks	
MMF Region	RHA
Thompson	Burntwood
	Churchill
Southeast	North Eastman
	South Eastman
Southwest	Brandon
	Assiniboine
	Central
The Pas	Nor-Man
Northwest	Parkland
Interlake	Interlake
Winnipeg	Winnipeg

Each Knowledge Network carefully examines the study results and documents *'what it now knows'*, which can result in practical *'changes to what is done'* in the health system and MMF program planning.

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Section 3: All Invasive Cancers

Cancer is a term used to describe a group of over 200 diseases which occur when abnormal cells in the body begin to grow uncontrollably (CancerCare Manitoba [CCMB], 2010a; World Health Organization [WHO], 2009). Invasive cancers are those forms of the disease that have spread beyond the immediate site of origin and into surrounding tissue (CCMB, 2010b). Invasive cancers have the potential to spread to other organs through the bloodstream and lymphatic system (CCMB, 2010a). For the purpose of this document, and consistent with the CCMB and international definitions of all invasive cancers, both non-melanoma skin cancers and lymphomas are excluded from this category.

The age-adjusted incidence of all invasive cancers was measured for all Manitoba residents over a ten-year time period: 1998-2007. Residents were considered to have one or more invasive cancers if they met one of the following conditions:

- Incidence: ICDO-3 codes C00 to C97 with invasive morphology, excluding non-melanoma skin cancers (code C44 with morphology outside of 8720-8790) and lymphomas (with morphology codes 9590-9989)

The denominator includes all Manitoba residents as of December 31, 2007. Based on the criteria above, there were 2,551 Metis and 53,098 All Other Manitoban cases of all invasive cancers during the 1998-2007 time period.

3.1 Percent of All Invasive Cancers

Key pie chart observations:

Both sexes (Figure 3.1.1 and Figure 3.1.2)

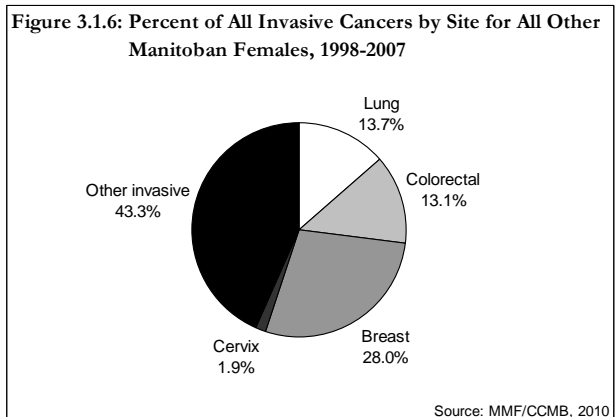
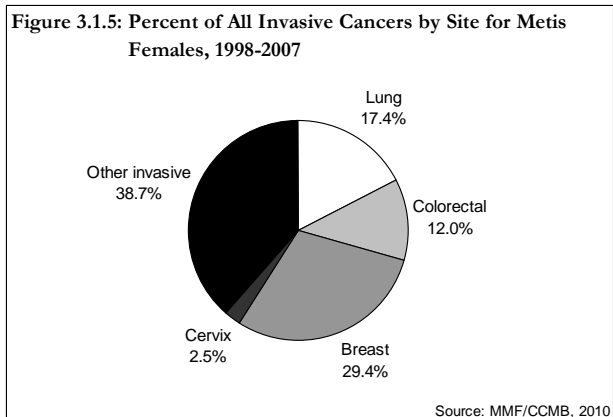
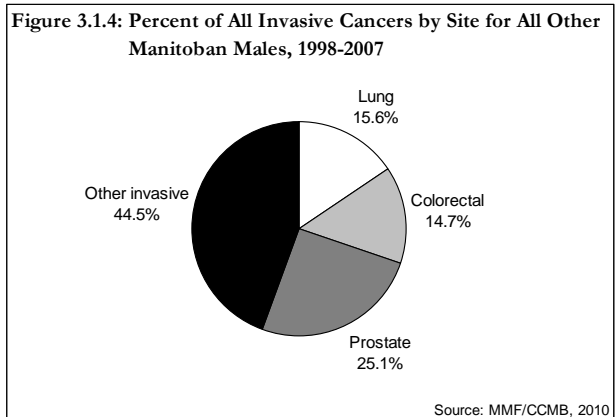
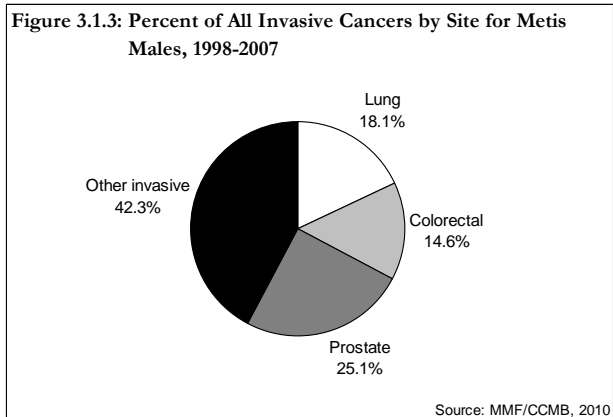
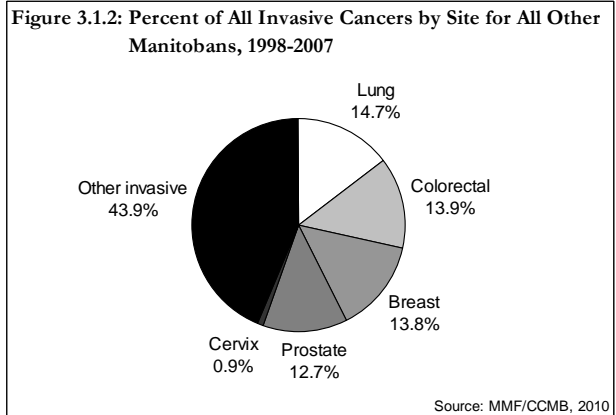
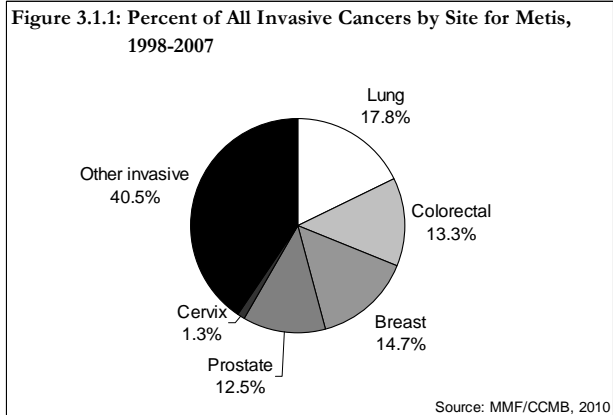
- For Metis overall, the proportions of all invasive cancers were very similar to those for All Other Manitobans: lung (17.8% vs. 14.7%); colorectal (13.3% vs. 13.9%); breast (14.7% vs. 13.8%); prostate (12.5% vs. 12.7%); cervical (1.3% vs. 0.9%); and 'all other invasive' cancers (40.5% vs. 43.9%)

Males (Figure 3.1.3 and Figure 3.1.4)

- Proportions of all invasive cancers were also similar for Metis males and All Other Manitoban males: lung (18.1% vs. 15.6%); colorectal (14.6% vs. 14.7%); prostate (25.1% vs. 25.1%); and 'all other invasive' cancers (42.3% vs. 44.5%)

Females (Figure 3.1.5 and Figure 3.1.6)

- Proportions of all invasive cancers for Metis females were also similar to those for All Other Manitoban females: lung (17.4% vs. 13.7%), colorectal (12.0% vs. 13.1%); breast (29.4% vs. 28.0%); cervical (2.5% vs. 1.9%); and 'all other invasive' cancers (38.7% vs. 43.3%)



3.2 Incidence Rates

Key observations by geography:

Both sexes (Figure 3.2.1)

Manitoba:

- There is no difference in rates of all invasive cancers in Metis compared to All Other Manitobans (469.7 vs. 458.5 per 100,000) in Manitoba

Aggregate areas:

- Metis have a higher rate of all invasive cancers compared to All Other Manitobans in Winnipeg (484.3 vs. 448.1 per 100,000)
- Metis have a lower rate of all invasive cancers compared to their provincial average in Mid aggregate area (433.6 vs. 469.7 per 100,000)
- All Other Manitobans have a lower rate of all invasive cancers than their provincial average in North (405.5 vs. 458.5 per 100,000) and Rural South (417.4 vs. 458.5) aggregate areas and in Winnipeg (448.1 vs. 458.5)

Males (Figure 3.2.2)

Manitoba:

- There is no difference in rates of all invasive cancers in Metis males compared to All Other Manitoban males in Manitoba (516.0 vs. 518.0 per 100,000)

Aggregate areas:

- There is no difference in rates of all invasive cancers in Metis males compared to All Other Manitoban males across aggregate areas
- Metis males do not have any difference in rates of all invasive cancers compared to their provincial average across aggregate areas
- All Other Manitoban males have a higher rate of all invasive cancers compared to their provincial average in Brandon (562.1 vs. 518.0 per 100,000) whereas All Other Manitoban males in North (462.6 vs. 518.0), Mid (500.5 vs. 518.0), and Rural South (463.4 vs. 518.0) aggregate areas have a lower rate of all invasive cancers compared to their provincial average

Females (Figure 3.2.3)

Manitoba:

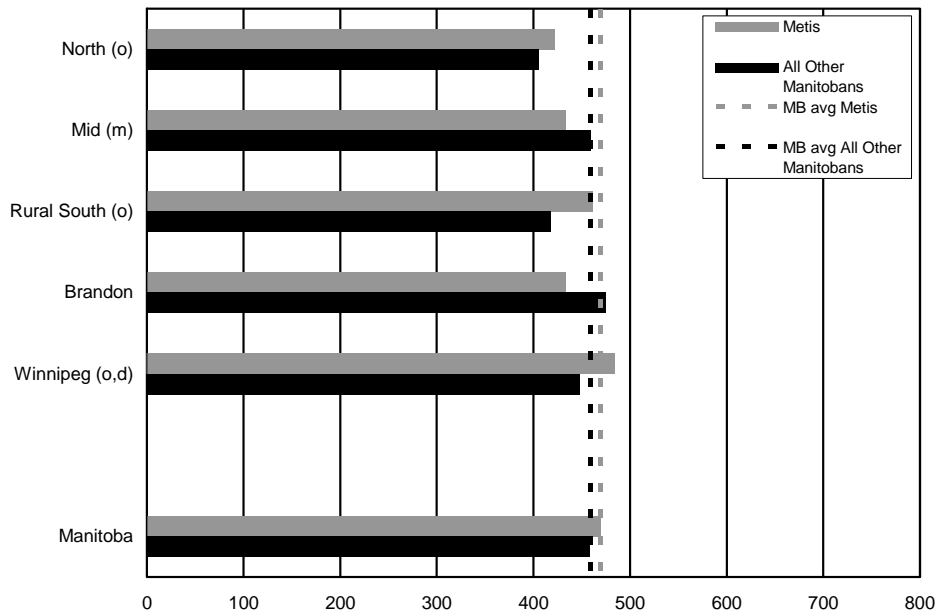
- There is no difference in rates of all invasive cancers in Metis females compared to All Other Manitoban females (430.9 vs. 418.6 per 100,000) in Manitoba

Aggregate areas:

- Metis females have a higher rate of all invasive cancers compared to All Other Manitoban females in Winnipeg (452.8 vs. 408.9 per 100,000)
- Metis females do not have any difference in rates of all invasive cancers compared to their provincial average across aggregate areas
- All Other Manitoban females have a lower rate of all invasive cancers in North (356.6 vs. 418.6 per 100,000) and Rural South (383.5 vs. 418.6) aggregate areas and in Winnipeg (408.9 vs. 418.6) compared to their provincial average

Figure 3.2.1: Rates of All Invasive Cancers by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents

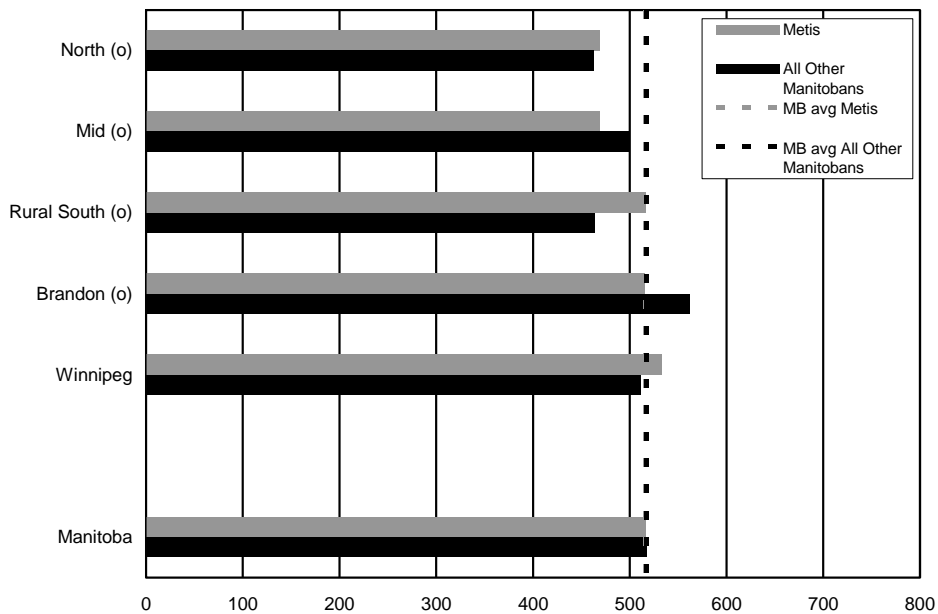


'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 3.2.2: Rates of All Invasive Cancers in Males by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents

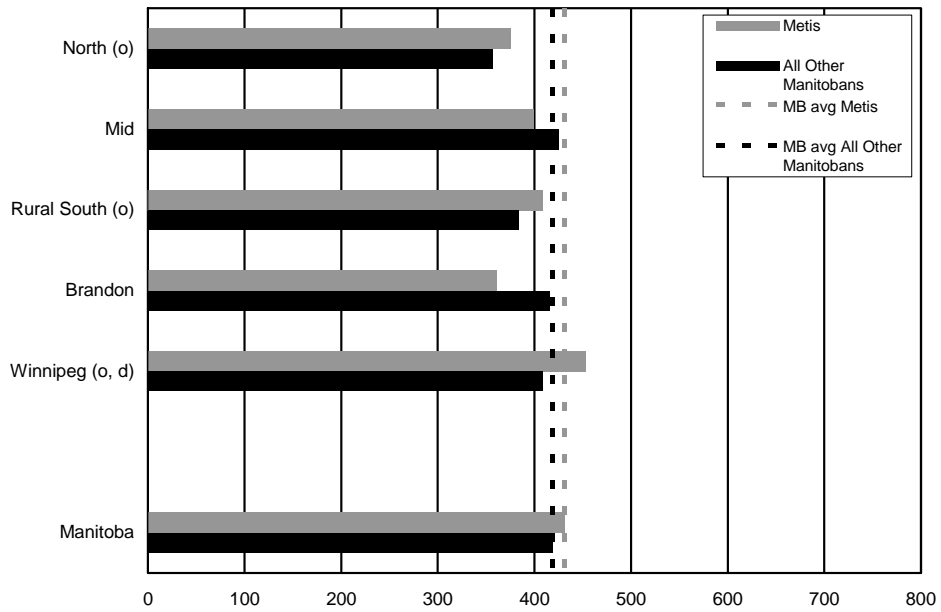


'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 3.2.3: Rates of All Invasive Cancers in Females by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis

'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans

'd' indicates the difference between the two groups' rates was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

3.3 Trending

Key Observations by time period (comparing 1993-1997 and 2003-2007 periods):

Both sexes (Figure 3.3.1 and Figure 3.3.2)

Manitoba:

- Metis have an increasing trend in rates of all invasive cancers (452.1, 475.9, and 463.8 per 100,000) whereas there is a decreasing trend in rates of all invasive cancers in All Other Manitobans in Manitoba (474.0, 466.2, and 451.4)

Aggregate areas:

- Metis have an increasing trend in rates of all invasive cancers in Rural South aggregate area (382.3, 508.4, and 420.5 per 100,000) whereas there is a decreasing trend in rates of all invasive cancers in Metis in Winnipeg (513.0, 475.8, and 490.2)
- For All Other Manitobans there is a significant decreasing trend in rates of all invasive cancers in North (430.3, 398.3, and 411.8 per 100,000), Mid (466.6, 462.6, and 455.8), Rural South (432.8, 431.9, and 403.5), and Winnipeg (461.7, 459.1, and 437.9)

Males (Figure 3.3.3 and Figure 3.3.4)

Manitoba:

- Metis (542.4, 536.8, and 498.5 per 100,000) and All Other Manitoban (565.5, 535.8, and 501.1) males have a decreasing trend in rates of all invasive cancers in Manitoba

Aggregate areas:

- Metis males have a decreasing trend in rates of all invasive cancers in Rural South aggregate area (496.9, 599.1, and 447.0 per 100,000) and Winnipeg (652.1, 524.2, and 539.2)
- All Other Manitoban males have a decreasing trend in rates of all invasive cancers in North (489.3, 466.9, and 457.8 per 100,000), Mid (527.8, 511.1, and 490.5), Rural South (509.3, 476.5, and 451.0), and Winnipeg (562.9, 538.6, and 486.5)

Females (Figure 3.3.5 and Figure 3.3.6)

Manitoba:

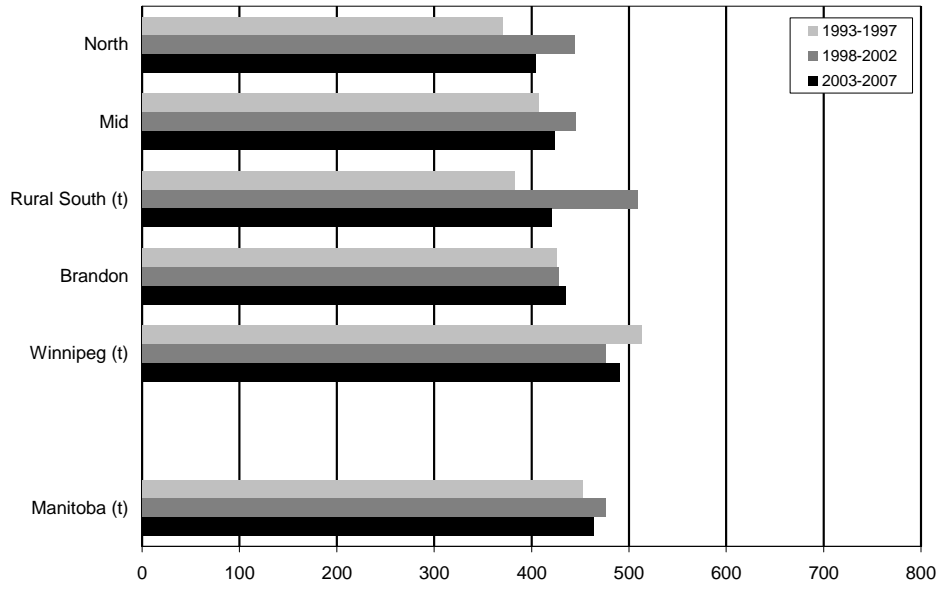
- Metis females (365.7, 423.0, and 435.8 per 100,000) have an increasing trend in rates of all invasive cancers whereas there is no trend in rates of all invasive cancers in All Other Manitoban females (410.6, 418.8, and 418.6)

Aggregate areas:

- Metis females have an increasing trend in rates of all invasive cancers in Rural South aggregate area (261.7, 417.4, and 397.6 per 100,000), Brandon (263.4, 421.9, and 311.1), and Winnipeg (401.2, 445.0, and 458.1)
- All Other Manitoban females have an increasing trend in rates of all invasive cancers in Winnipeg (397.0, 408.1, and 409.7 per 100,000)

Figure 3.3.1: Rates of All Invasive Cancers in Metis by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

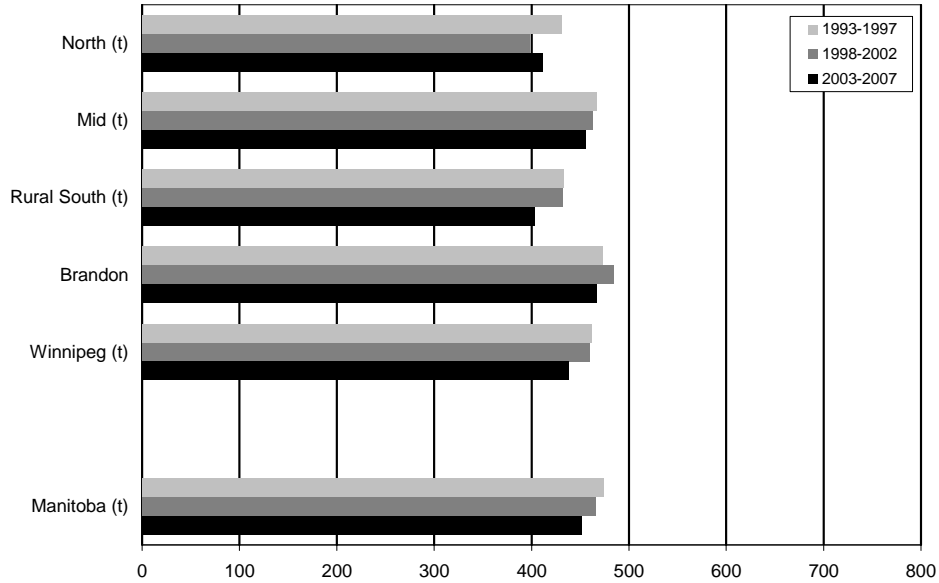


't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 3.3.2: Rates of All Invasive Cancers in All Other Manitobans by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

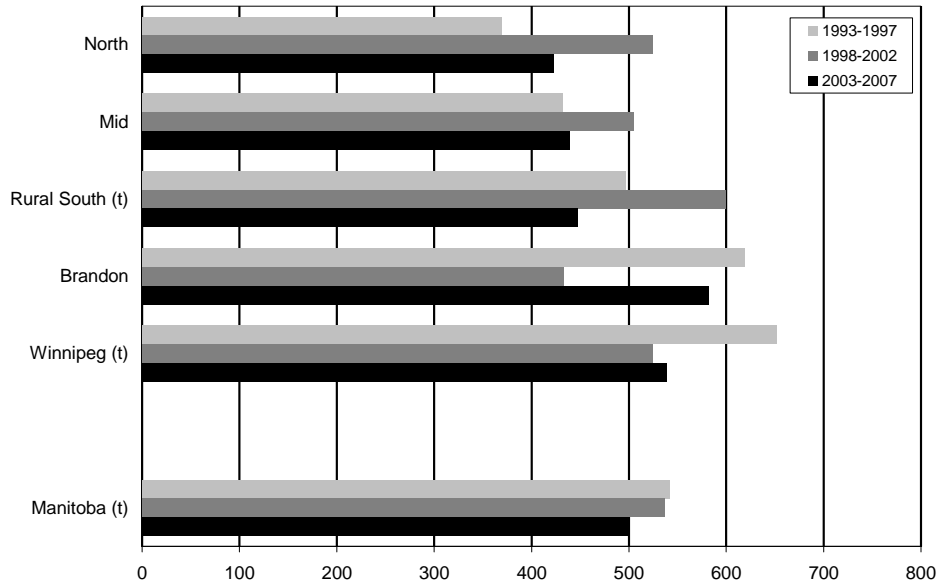


't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 3.3.3: Rates of All Invasive Cancers in Metis Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

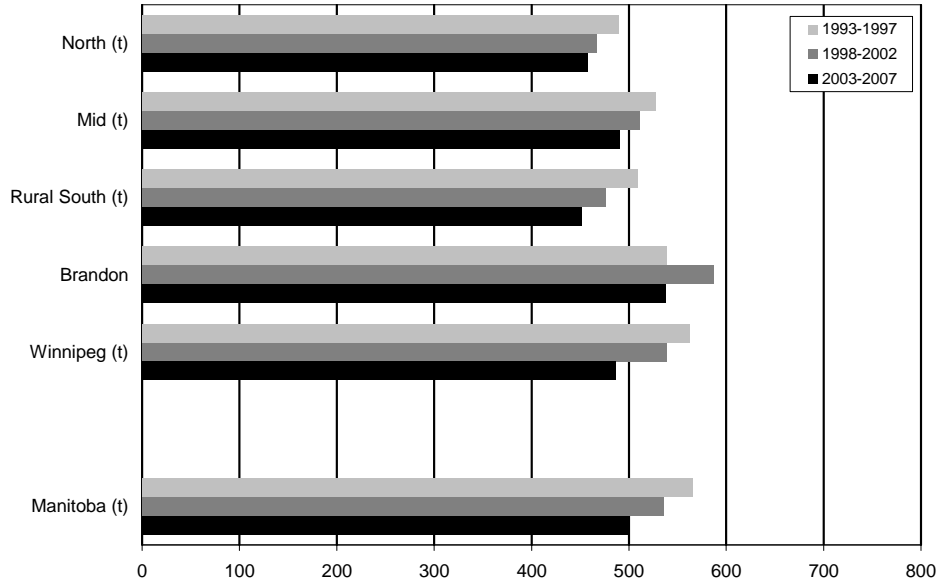


't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 3.3.4: Rates of All Invasive Cancers in All Other Manitoban Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

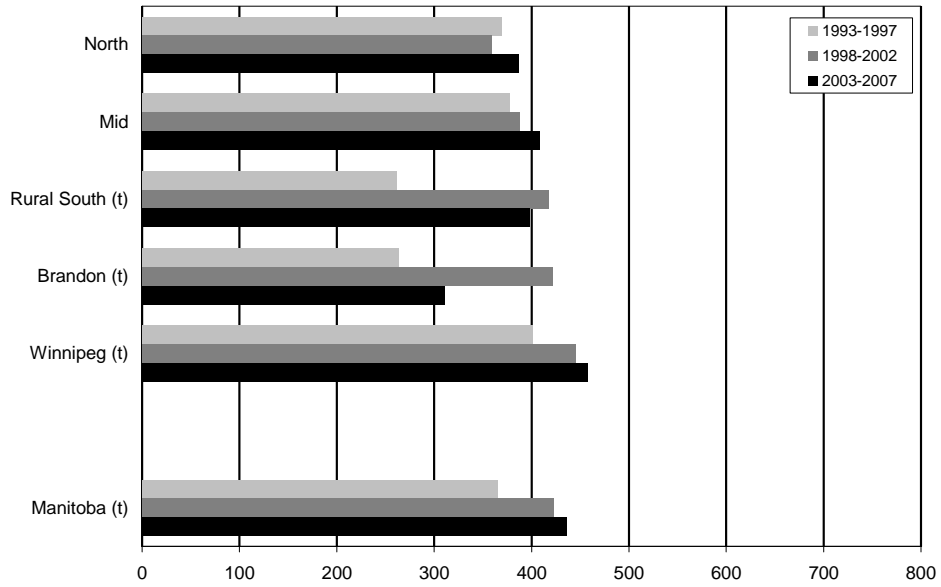


't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 3.3.5: Rates of All Invasive Cancers in Metis Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

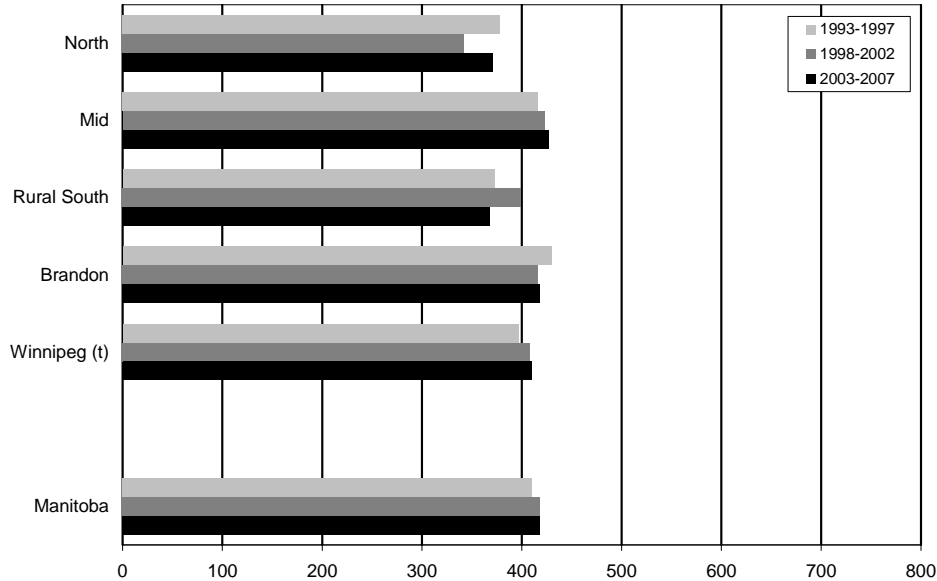


't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 3.3.6: Rates of All Invasive Cancers in All Other Manitoban Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(Compared to the results in this study – *in italics*)

According to the WHO (2010), cancer is now the leading cause of mortality worldwide, accounting for 7.9 million deaths (approximately 13% of all deaths) in 2007. In Canada it is estimated that there will be nearly 174,000 new cases of all invasive cancers in 2010, with an incidence rate of 403 per 100,000 people; nearly 76,000 will likely die from the disease in that year, representing a mortality rate of 170 deaths per 100,000 individuals (Canadian Cancer Society's Steering Committee, 2010). It is expected that more men will be diagnosed with all invasive cancers than women (51.7% vs. 48.3% of all new cases in 2010). While this difference between the sexes is narrowing from previous years, the proportion of cancer deaths remains consistently higher for men compared to women (52.5% vs. 47.5%) (Canadian Cancer Society's Steering Committee, 2010). Excluding non-melanoma skin cancer, the top four cancers diagnosed in Canada in 2010 are consistently lung, colorectal, prostate, and breast cancers (Canadian Cancer Society's Steering Committee, 2010).

In Manitoba it is estimated that in 2010 more than 6,000 individuals will be diagnosed with an all invasive cancer, with an incidence rate of 457.8 per 100,000 individuals; close to 3,800 will die from the disease, representing a mortality rate of 209.1 per 100,000 persons (CCMB, 2010a). Between 1988 and 2007, cancer incidence has decreased slightly for men and increased slightly for women; mortality rates for both groups combined are gradually decreasing in the province (CCMB, 2010a). While the absolute number of new cancer cases (and deaths from cancer) are expected to continue increasing as they have since 1976, this is mainly due to Manitoba's slowly expanding and rapidly aging population (CCMB, 2010a). Note that the standard population for the Canadian Cancer Society's report is different than that used in CCMB studies, including this one.

Cancer is a significant cause of mortality in Metis. In a recent study cancer was found to be the second most common cause of death for Metis men in Canada (23% of all deaths), second only to circulatory system diseases; it was the leading cause of death for Metis females (33% of all deaths) (Tjepkema, Wilkins, Sénécal, Guimond, & Penney, 2009). In the Metis Atlas cancer was found to be the leading cause of death for Metis in Manitoba, representing 30.6% of all deaths between 2002 and 2006 (Martens, Bartlett, et al., 2010).

In our study proportions of all invasive cancers in Metis and All Other Manitobans are quite similar. In both groups lung cancer (17.8% vs. 14.7%) is the most common. Breast (14.7% vs. 13.8%), colorectal (13.3% vs. 13.9%), and prostate (12.5% vs. 12.7%) cancers are present in similar proportions, while cervical cancer (1.3% vs. 0.9%) is least common for both groups. Metis and All Other Manitobans also have similar proportions of other invasive cancers (40.5% vs. 43.9%). Prostate cancer (25.1% vs. 25.1%) is most common among Metis males and All Other Manitoban males, followed by lung (18.1% vs. 15.6%), colorectal (14.6% vs. 14.7%), and other invasive (42.3% vs. 44.5%) cancers. In Metis females and All Other Manitoban females breast cancer (29.4% vs. 28.0%) is most common, followed by lung (17.4% vs. 13.7%), colorectal (12.0% vs. 13.1%), cervical (2.5% vs. 1.9%), and other invasive (38.7% vs. 43.3%) cancers. While not tested for statistical significance, the proportion of lung cancer stands out as consistently different in Metis compared to All Other Manitobans.

In our study there is no significant difference between rates of all invasive cancers in Metis and All Other Manitobans at the provincial level (469.7 vs. 458.5 per 100,000); there is also no significant difference between Metis males and All Other Manitoban males (516.0 vs. 518.0) and Metis females and All Other Manitoban females (430.9 vs. 418.6) provincially. However, there is a significant difference between rates of

all invasive cancers in Metis and All Other Manitobans overall in Winnipeg (484.3 vs. 448.1 per 100,000); this statistical difference in Winnipeg is not found in Metis males and All Other Manitoban males (533.0 vs. 511.7) but is present in Metis females and All Other Manitoban females (452.8 vs. 408.9). There are no other statistical differences in rates of all invasive cancers between Metis and All Other Manitobans. However, Metis in Mid aggregate area have a significantly lower rate compared to their provincial average (433.6 vs. 469.7 per 100,000).

It is also worth noting that in our study there is a substantial difference in rates of all invasive cancers between Metis males and Metis females (516.0 vs. 430.9 per 100,000) and between All Other Manitoban males and All Other Manitoban females (518.0 vs. 418.6). While statistical significance was not tested for these differences, the rates of all invasive cancers are 19.7% higher in Metis males compared to Metis females and 23.7% higher in All Other Manitoban males compared to All Other Manitoban females, indicating similar male/female proportions of all invasive cancer incidence in both populations.

There are many statistically significant trends in rates of all invasive cancers evident in our study. In Manitoba, Metis overall have a significant increasing trend (452.1, 475.9, and 463.8 per 100,000) when comparing rates for 1993-1997 and 2003-2007, while All Other Manitobans overall have a significant decreasing trend (474.0, 466.2, and 451.4). At this same provincial level both Metis males (542.4, 536.8, and 498.5 per 100,000) and All Other Manitoban males (565.5, 535.8, and 501.1) have significant decreasing trends, Metis females have a significant increasing trend (365.7, 423.0, and 435.8), and All Other Manitoban females have no significant trend at all (410.6, 418.8, and 418.6).

For Metis overall, rates of all invasive cancers are trending upward in Rural South (382.3, 508.4, and 420.5 per 100,000) and downward in Winnipeg (513.0, 475.8, and 490.2); for All Other Manitobans overall, rates are trending downward in every area except Brandon: in North (430.3, 398.3, and 411.8), Mid (466.6, 462.6, and 455.8), and Rural South (432.8, 431.9, and 403.5) aggregate areas and in Winnipeg (461.7, 459.1, and 437.9). Metis males have decreasing trends in rates of all invasive cancers in Rural South (496.9, 599.1, and 447.0 per 100,000) and Winnipeg (652.1, 524.2, and 539.2), while All Other Manitoban males have decreasing trends in rates in all areas except Brandon: North (489.3, 466.9, and 457.8), Mid (527.8, 511.1, and 490.5), Rural South (509.3, 476.5, and 451.0), and Winnipeg (562.9, 538.6, and 486.5). There are no increasing trends in Metis males or All Other Manitoban males. In contrast, there are no significant decreasing trends for either Metis or All Other Manitoban females in rates of all invasive cancers. Metis females have significant increasing trends in Rural South aggregate area (261.7, 417.4, and 397.6 per 100,000), Brandon (263.4, 421.9, and 311.1), and Winnipeg (401.2, 445.0, and 458.1); All Other Manitoban females are trending upward only in Winnipeg (397.0, 408.1, and 409.7).

For program and policy considerations, rates of all invasive cancers in Metis females stand out as particularly relevant. Increasing trends in the rural and urban south, and a significantly higher rate compared to All Other Manitoban females in Winnipeg, indicate areas for further investigation.

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Section 4: Lung Cancer

Lung cancer results from uncontrolled cell growth in the tissues of the lung. There are four major types of lung cancer: adenocarcinoma, squamous cell carcinoma, small cell carcinoma, and large cell carcinoma (Alberg, Brock, & Samet, 2005). Globally, lung cancer is the most common cause of cancer mortality (Schwartz, Prysak, Bock, & Cote, 2007).

The age-adjusted incidence of lung cancer was measured for all residents over a ten-year period: 1998-2007. Residents were considered to have lung cancer if they met one of the following conditions:

- Incidence: ICDO-3 code C34

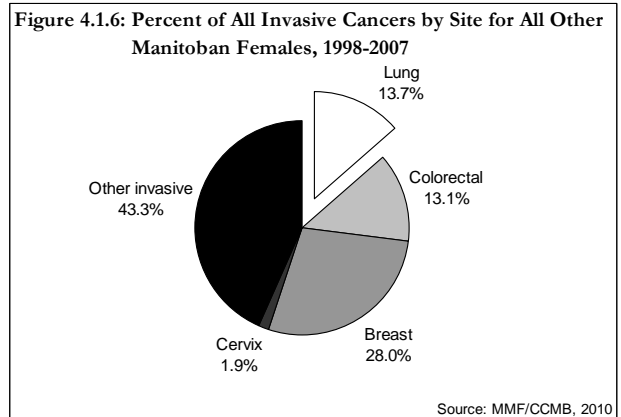
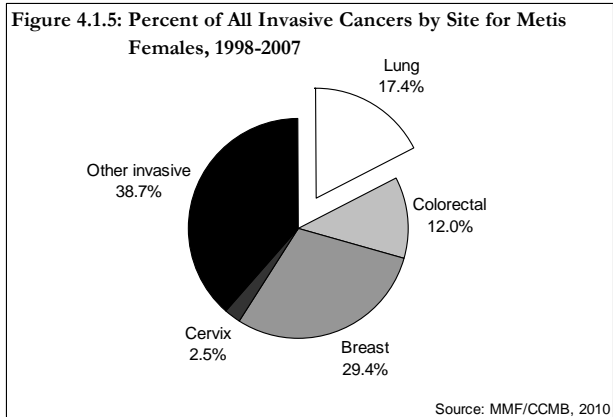
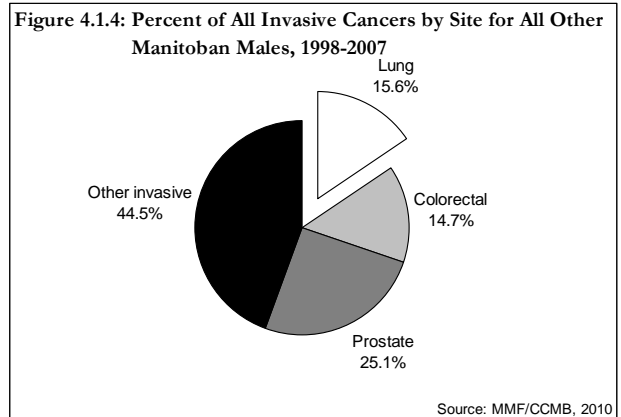
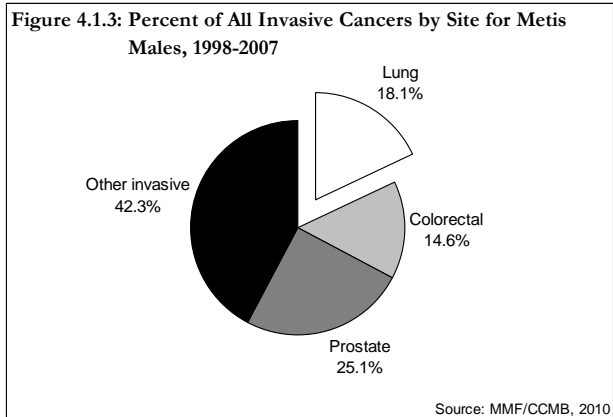
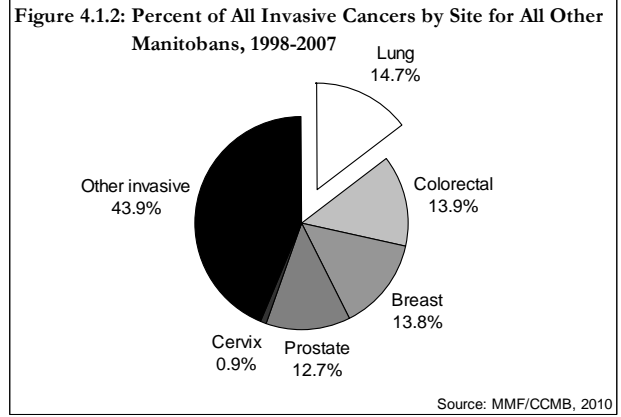
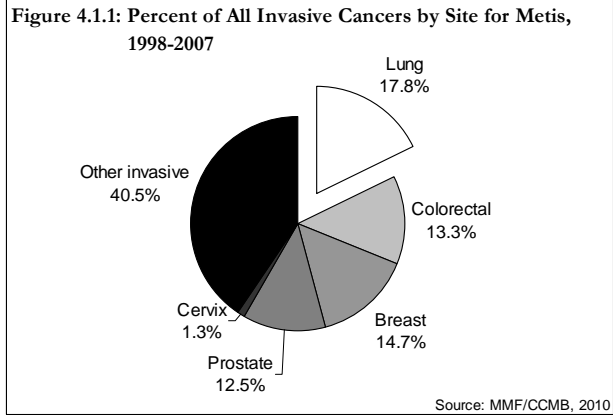
The denominator includes all Manitoba residents as of December 31, 2007. Based on the criteria above, there were 453 Metis and 7,788 All Other Manitoban cases of lung cancer during the 1998-2007 time period.

4.1 Percent of All Invasive Cancers

Key pie chart observations:

Both sexes, males, and females (Figure 4.1.1 to Figure 4.1.6)

- Lung cancer comprised 17.8% (18.1% for males; 17.4% for females) of all invasive cancers diagnosed in Metis in Manitoba from 1998 to 2007. The proportion for All Other Manitobans was 14.7% (15.6% for males; 13.7% for females).



4.2 Incidence Rates

Key Observations by geography:

Both sexes (Figure 4.2.1)

Manitoba:

- Metis have a higher rate of lung cancer compared to All Other Manitobans in Manitoba (87.1 vs. 67.1 per 100,000)

Aggregate areas:

- Metis have a higher rate of lung cancer compared to All Other Manitobans in Rural South aggregate area (84.4 vs. 52.6 per 100,000) and in Winnipeg RHA (88.7 vs. 67.3)
- Metis do not have any difference in rates of lung cancer compared to their provincial average at the aggregate level
- All Other Manitobans have a higher rate of lung cancer compared to their provincial average in Brandon (75.2 vs. 67.1 per 100,000) whereas All Other Manitobans have a lower rate of lung cancer compared to their provincial average in Rural South aggregate area (52.6 vs. 67.1)

Males (Figure 4.2.2)

Manitoba:

- Metis males have a higher rate of lung cancer compared to All Other Manitobans in Manitoba (98.0 vs. 81.6 per 100,000)

Aggregate areas:

- Metis males have a higher rate of lung cancer compared to All Other Manitobans in Rural South (97.6 vs. 65.1 per 100,000)
- Metis males do not have any difference in rates of lung cancer compared to their provincial average at aggregate level
- All Other Manitoban males have a lower rate of lung cancer than their provincial average in Rural South aggregate area (65.1 vs. 81.6 per 100,000)

Females (Figure 4.2.3)

Manitoba:

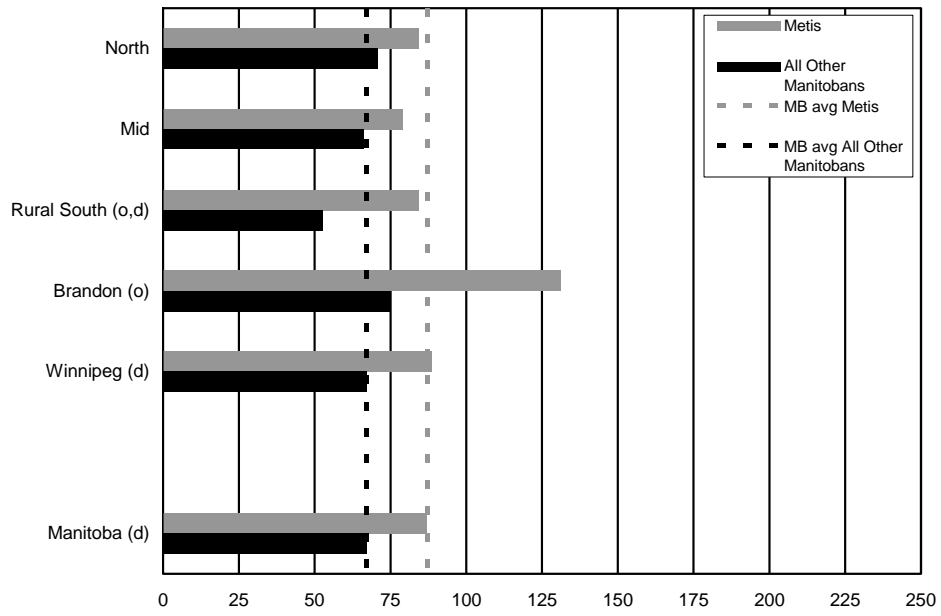
- Metis females have a higher rate of lung cancer compared to All Other Manitoban females in Manitoba (78.0 vs. 56.3 per 100,000)

Aggregate areas:

- Metis females have a higher rate of lung cancer compared to All Other Manitoban females in Rural South aggregate area (71.8 vs. 42.8 per 100,000) and Winnipeg RHA (82.3 vs. 57.0)
- Metis females do not have any difference in rates of lung cancer compared to their provincial average at aggregate level
- All Other Manitoban females have a lower rate of lung cancer than their provincial average in Rural South aggregate area (42.8 vs. 56.3 per 100,000)

Figure 4.2.1: Rates of Lung Cancer by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents

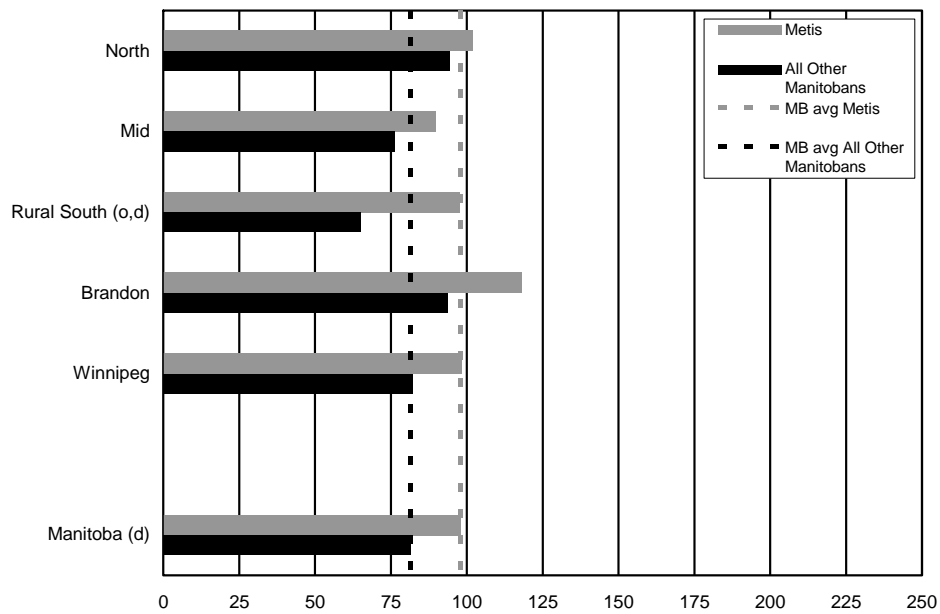


'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 4.2.2: Rates of Lung Cancer in Males by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents

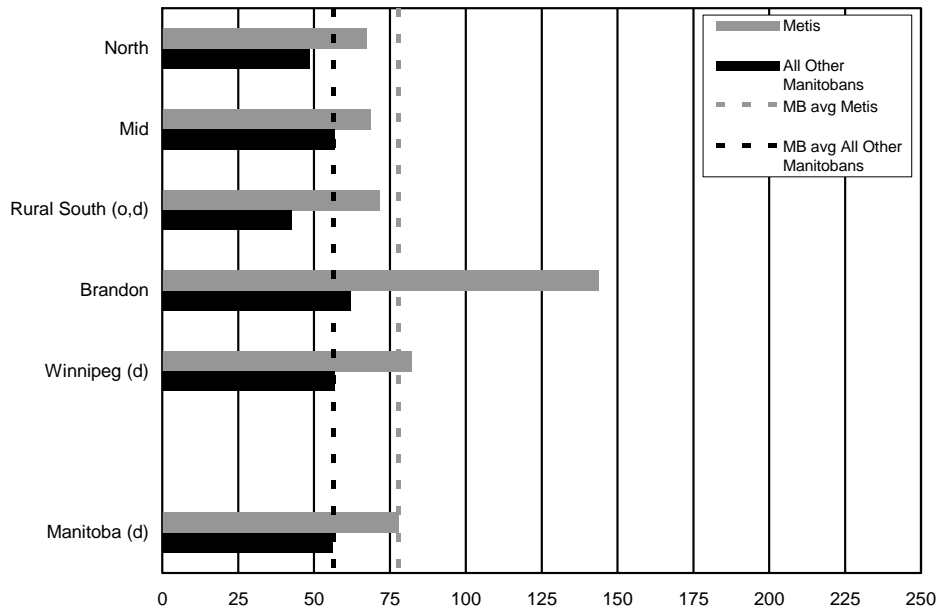


'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 4.2.3: Rates of Lung Cancer in Females by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



Source: MMF/CCMB, 2010

4.3 Trending

Key Observations by time period (comparing 1993-1997 and 2003-2007 periods):

Both Sexes (Figure 4.3.1 and Figure 4.3.2)

Manitoba:

- Metis (86.2, 80.3, and 92.6 per 100,000) and All Other Manitobans (67.6, 67.5, and 66.9) have no trend in rates of lung cancer in Manitoba

Aggregate areas:

- Metis have no trend in rates of lung cancer at the aggregate level
- All Other Manitobans have no trend in rates of lung cancer at the aggregate level

Males (Figure 4.3.3 and Figure 4.3.4)

Manitoba:

- Metis males have no trend in rates of lung cancer (104.4, 94.5, and 100.8 per 100,000) in Manitoba
- All Other Manitoban males have a decreasing trend in rates of lung cancer (91.7, 84.4, and 79.2 per 100,000) in Manitoba

Aggregate areas:

- Metis males have an increasing trend in rates of lung cancer in Rural South aggregate area (91.6, 88.3, and 106.0 per 100,000)
- All Other Manitoban males have an increasing trend in rates of lung cancer in North aggregate area (78.8, 102.4, and 87.4 per 100,000) and a decreasing trend in rates of lung cancer in Winnipeg RHA (96.5, 88.2, and 76.7)

Females (Figure 4.3.5 and Figure 4.3.6)

Manitoba:

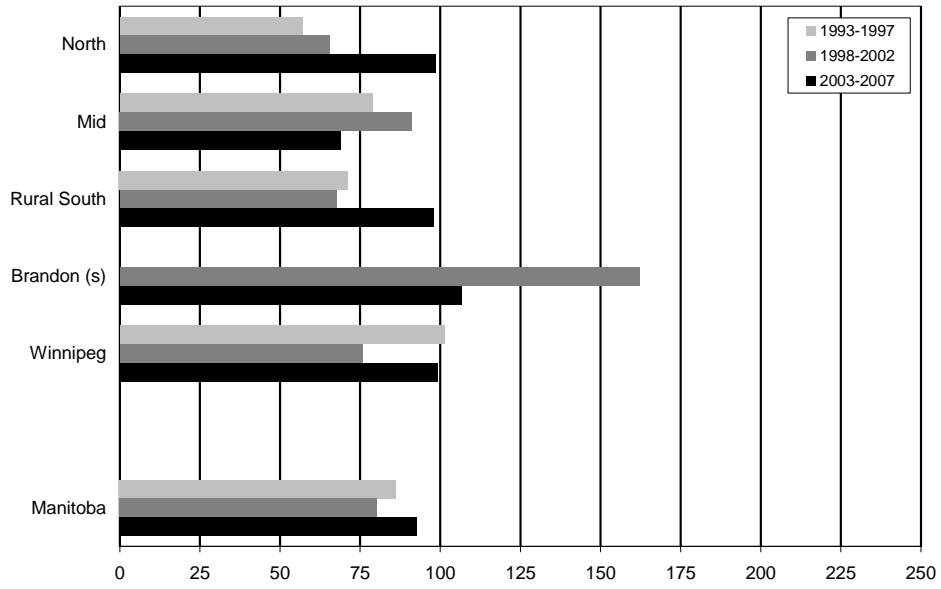
- Metis females (68.8, 68.0, and 85.8 per 100,000) and All Other Manitoban females (49.7, 54.9, and 57.8) have no trend in rates of lung cancer in Manitoba

Aggregate areas:

- Metis females have no trend in rates of lung cancer at the aggregate level
- While the 1998-2002 lung cancer incidence rate appears very high in Brandon (253.4 per 100,000), this finding is based on a very small number of cases and could vary widely
- All Other Manitoban females have an increasing trend in rates of lung cancer in Rural South aggregate area (31.7, 45.8, and 40.0 per 100,000)

Figure 4.3.1: Rates of Lung Cancer in Metis by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



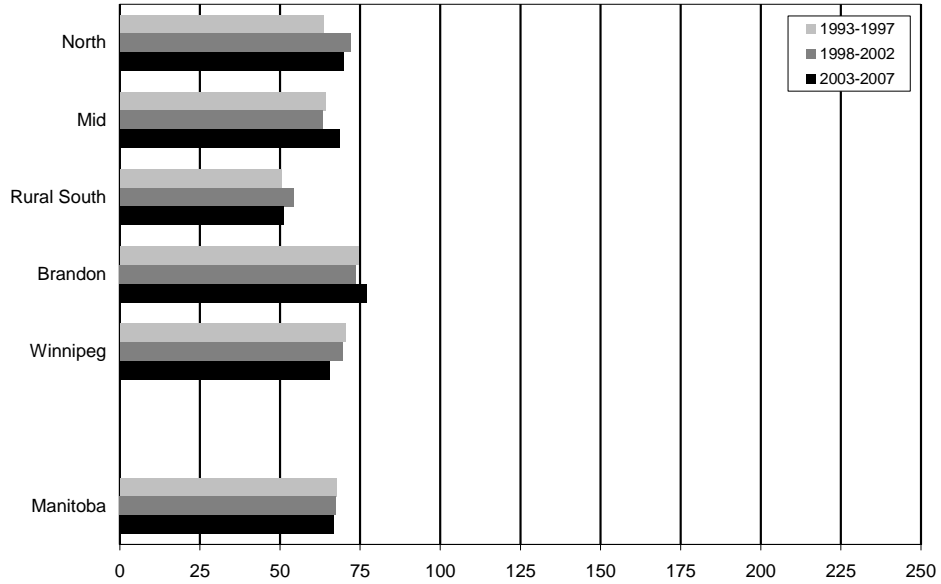
't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 4.3.2: Rates of Lung Cancer in All Other Manitobans by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



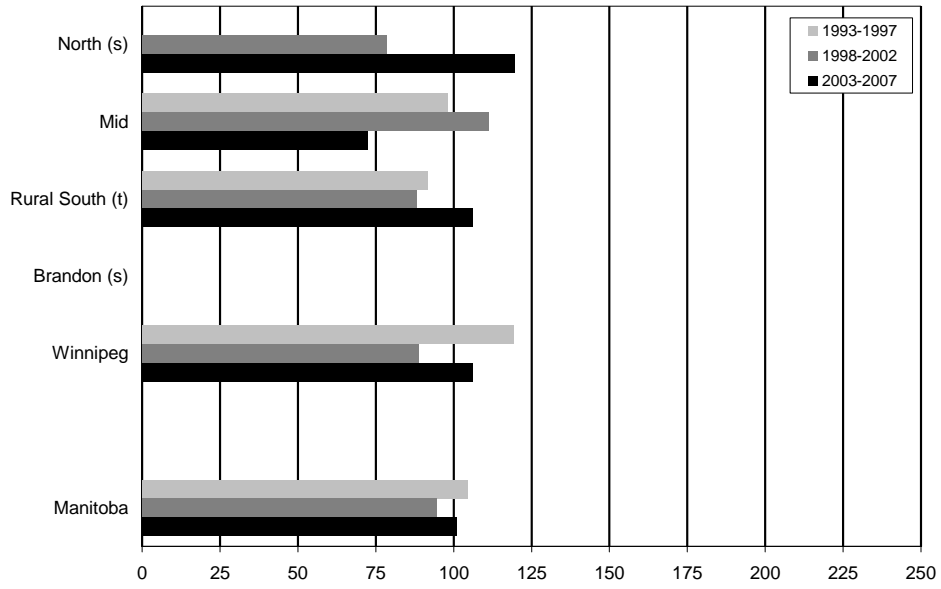
't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 4.3.3: Rates of Lung Cancer in Metis Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



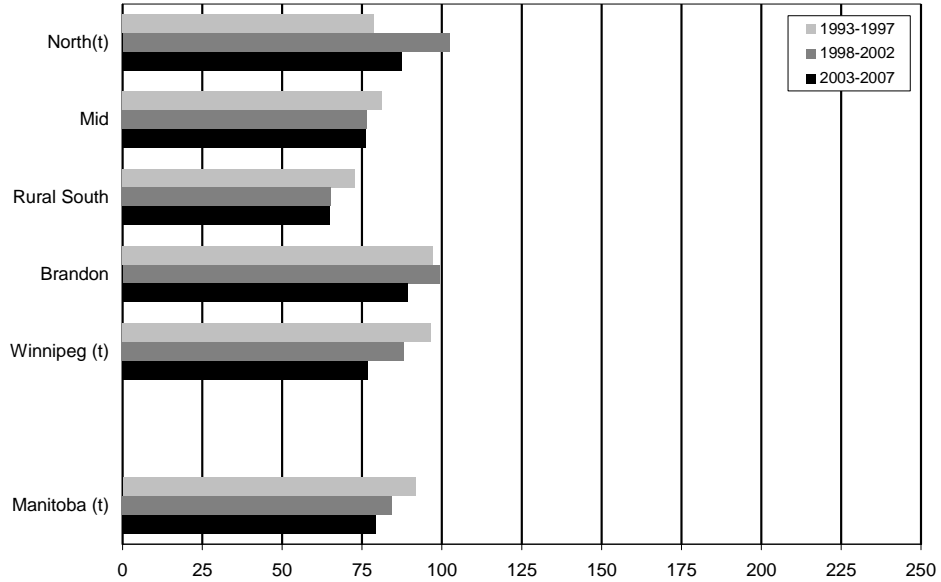
't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 4.3.4: Rates of Lung Cancer in All Other Manitoban Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



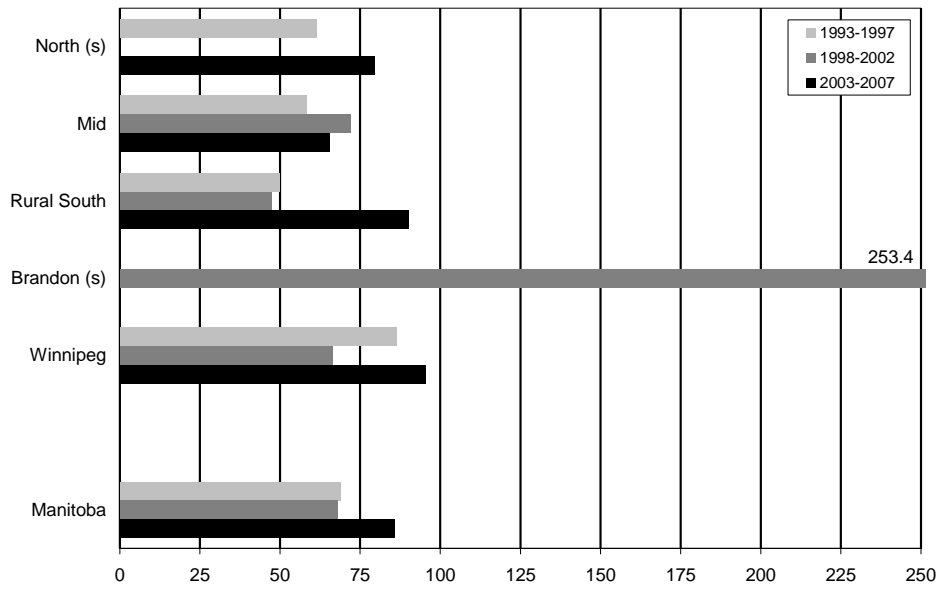
't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 4.3.5: Rates of Lung Cancer in Metis Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



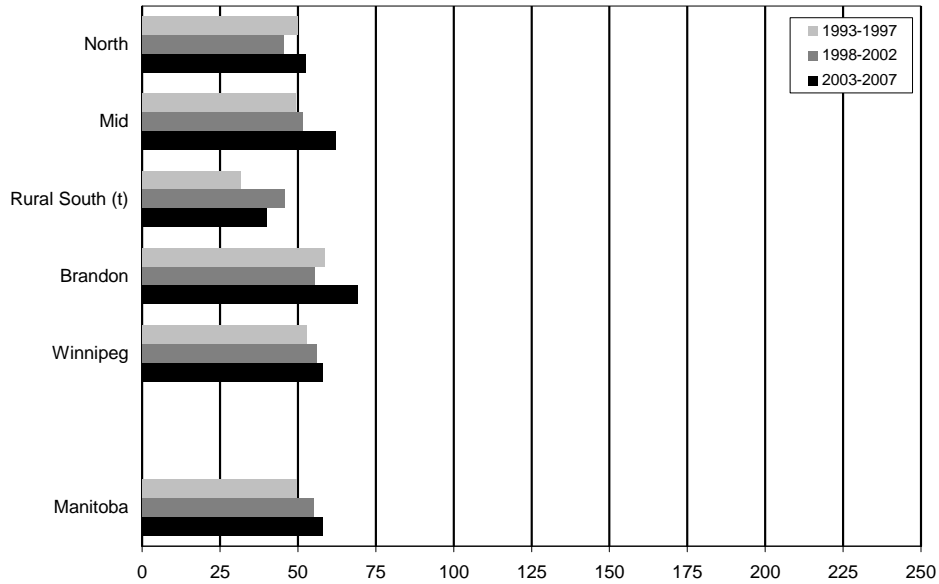
't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 4.3.6: Rates of Lung Cancer in All Other Manitoban Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – in italics)

In 2002, there were 1.35 million cases of lung cancer (representing 12.4% of all new cancers) and 1.18 million deaths from the disease (representing 17.6% of deaths from cancer) worldwide (Parkin, Ferlay, & Pisani, 2005). It is estimated that in 2010 there will be 24,200 new cases of lung cancer in Canada, with an age-standardized incidence rate for lung cancer of 55 per 100,000 (Canadian Cancer Society's Steering Committee, 2010). The estimated number of deaths from lung cancer in Canada in 2010 is 20,600, with an age-standardized mortality rate of 47 per 100,000 (Canadian Cancer Society's Steering Committee, 2010). Based on data from the previous decade (2000-2002 and 2005-2007), CancerCare Manitoba (2010) reported a lung cancer incidence rate of 68.8 per 100,000 and an age-standardized mortality rate of 50.4 per 100,000 in this province. Lung cancer contributes greatly to the burden of disease on the Manitoba population: despite being highly preventable, it has a poorer survival rate than colorectal, breast, and prostate cancer (CancerCare Manitoba, 2010). However, survival rates for Manitobans with lung cancer are the highest in Canada (CancerCare Manitoba, 2010). Note that the standard population for the Canadian Cancer Society's report is different than that used in CCMB studies, including this one.

A clear association between smoking and lung cancer has been established since the 1950s (Alberg et al., 2005). In the 1991 Aboriginal Peoples Survey, 54% of Metis respondents aged 15 years and older reported being a current smoker (Normand, 1996); this proportion was close to the same (56%) for Metis youth aged 15-24 (Stephens, 1994), but more than double the proportion (23%) for the general Canadian population (Lamouche, 2002). Reporting on results from the Canadian Community Health Survey, Martens, Bartlett, et al. (2010) found that significantly more Manitoba Metis aged 12 years or older reported smoking daily or occasionally compared to All Other Manitobans in the same age range (33.3% vs. 21.7%). Further, they noted that a statistically higher proportion of Metis youth (aged 12-19 years) in Manitoba reported smoking daily or occasionally compared to All Other Manitoban youth (26.2% vs. 14.0%) (Martens, Bartlett, et al., 2010). While smoking rates among Metis appear to have decreased substantially, they are still significantly higher than those for the general population.

In the past three decades, second-hand smoke or 'passive smoking' has also been found to be a risk factor for lung cancer (Alberg et al., 2005). Using results from the Canadian Community Health Survey, the Metis Atlas reported that a statistically higher percent of Metis in Manitoba were exposed to smoke in the home compared to All Other Manitobans (27.2% vs. 16.7%) (Martens, Bartlett, et al., 2010). Furthermore, they found a PMR gradient, where RHAs with higher premature mortality rates showed rates of exposure to smoke in the home (Martens, Bartlett, et al., 2010).

There is no comparable literature on rates of lung cancer in Metis. In our study lung cancer was the most common cancer for Metis and All Other Manitobans overall (17.8% vs. 14.7%). While not tested for statistical significance, lung cancer makes up a somewhat greater proportion of all cancers among Metis compared to All Other Manitobans in both sex groups: 18.1% compared to 15.6% for males and 17.4% compared to 13.7% for females. This higher proportion in Metis is reflected in the incidence data, where there is a statistically higher rate of lung cancer in Metis compared to All Other Manitobans (87.1 vs. 67.1 per 100,000) in Manitoba. This is also true for both Metis males (98.0 vs. 81.6 per 100,000) and Metis females (78.0 vs. 56.3) at the provincial level.

There are very few statistically significant trends in rates of lung cancer in our study. Comparing rates for 1993-1997 and 2003-2007 at the provincial level, rates of lung cancer are not increasing or decreasing significantly for Metis and All Other Manitobans overall, Metis males, Metis females, or All Other Manitoban females. At the regional level there are several significant trends in rates of lung cancer. Metis males in Rural South aggregate area have a significant increasing trend (91.6, 88.3, and 106.0 per 100,000), while All Other Manitoban males in North aggregate area have a significant increasing trend (78.8, 102.4, and 87.4) and All Other Manitoban males in Winnipeg have a significant decreasing trend (96.5, 88.2, and 76.7). Metis females have no significant trends in rates of lung cancer, while All Other Manitoban females have one significant trend: an increasing rate of lung cancer in Rural South aggregate area (31.7, 45.8, and 40.0 per 100,000).

Rates of lung cancer in Metis in Manitoba, and particularly in Winnipeg for Metis females and in Rural South aggregate area for both sexes, are higher than those in All Other Manitobans. The increasing trend in rates of lung cancer in Metis males in Rural South aggregate area is particularly worth noting by policy developers and program deliverers. Targeted smoking cessation programs in these and other areas for Metis may influence these rates over the long term.

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Section 5: Colorectal Cancer

Cancerous tumors of the colon and rectum are growths arising from the inner wall of the large intestine. These growths, called polyps, do not invade nearby tissue or spread to other parts of the body (Northover, Arnott, Jass, & Williams, 2002). They can be easily removed during a procedure called colonoscopy and are not life-threatening, but if not removed from the large intestine they may become malignant (cancerous) over time. Cancer of the colon and rectum (also referred to as colorectal cancer) can invade and damage nearby tissues and organs (Canadian Cancer Society, 2010). Cancer cells can also break away from the original site and spread to other parts of the body, such as liver and lungs, where new tumors form (Northover et al., 2002). Once this process, called metastasis of the colon cancer, has occurred, a complete cure of the cancer is unlikely (Northover et al., 2002).

The age-adjusted incidence of colorectal cancer was measured for all residents over a ten-year period: 1998-2007. Residents were considered to have colorectal cancer if they met one of the following conditions:

- Incidence: ICDO-3 codes C18, C19, C20, C21, and C26.0

The denominator includes all Manitoba residents as of December 31, 2007. Based on the criteria above, there were 339 Metis and 7,397 All Other Manitoban cases of colorectal cancer during the 1998-2007 time period.

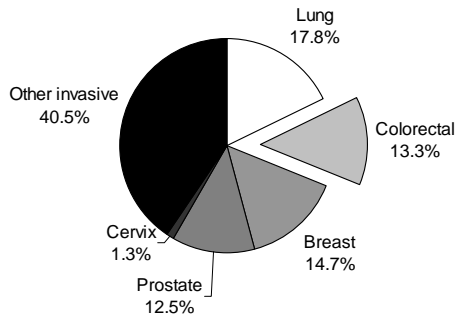
5.1 Percent of All Invasive Cancers

Key pie chart observations:

Both sexes, males, and females (Figure 5.1.1 to Figure 5.1.6)

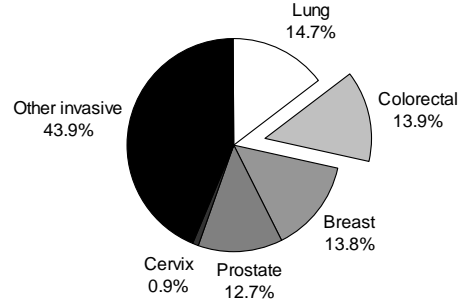
- Colorectal cancer comprised 13.3% (14.6% for males; 12.0% for females) of all invasive cancers diagnosed for Metis in Manitoba between 1998 and 2007. The proportion for All Other Manitobans was similar at 13.9% (14.7% for males; 13.1% for females).

Figure 5.1.1: Percent of All Invasive Cancers by Site for Metis, 1998-2007



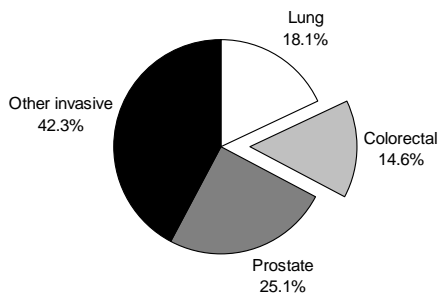
Source: MMF/CCMB, 2010

Figure 5.1.2: Percent of All Invasive Cancers by Site for All Other Manitobans, 1998-2007



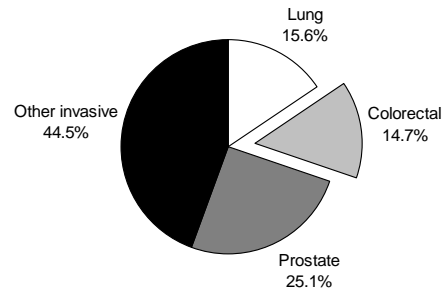
Source: MMF/CCMB, 2010

Figure 5.1.3: Percent of All Invasive Cancers by Site for Metis Males, 1998-2007



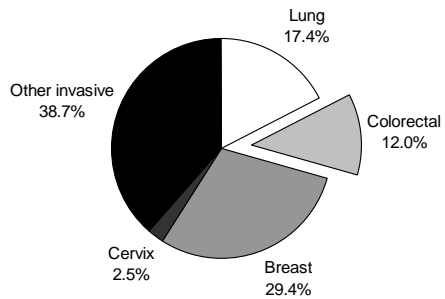
Source: MMF/CCMB, 2010

Figure 5.1.4: Percent of All Invasive Cancers by Site for All Other Manitoban Males, 1998-2007



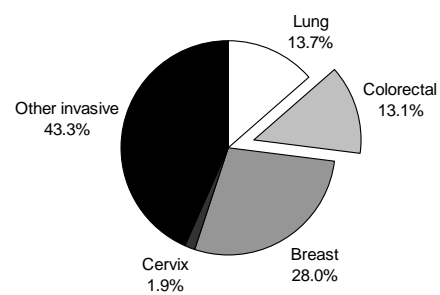
Source: MMF/CCMB, 2010

Figure 5.1.5: Percent of All Invasive Cancers by Site for Metis Females, 1998-2007



Source: MMF/CCMB, 2010

Figure 5.1.6: Percent of All Invasive Cancers by Site for All Other Manitoban Females, 1998-2007



Source: MMF/CCMB, 2010

5.2 Incidence Rates

Key Observations by geography:

Both sexes (Figure 5.2.1)

Manitoba:

- There is no difference in rates of colorectal cancer in Metis compared to All Other Manitobans (65.3 vs. 63.8 per 100,000) in Manitoba

Aggregate areas:

- There is no difference in rates of colorectal cancer in Metis compared to All Other Manitobans at the aggregate level
- Metis do not have any difference in rates of colorectal cancer compared to their provincial average at the aggregate level
- All Other Manitobans have a lower rate of colorectal cancer compared to their provincial average in Winnipeg (60.4 vs. 63.8 per 100,000)

Males (Figure 5.2.2)

Manitoba:

- There is no difference in rates of colorectal cancer in Metis males compared to All Other Manitoban males (74.4 vs. 76.4 per 100,000) in Manitoba

Aggregate areas:

- There is no difference in rates of colorectal cancer in Metis males compared to All Other Manitoban males at the aggregate level
- Metis males do not have any difference in rates of colorectal cancer compared to their provincial average at the aggregate level
- All Other Manitoban males do not have any difference in rates of colorectal cancer compared to their provincial average at the aggregate level

Females (Figure 5.2.3)

Manitoba:

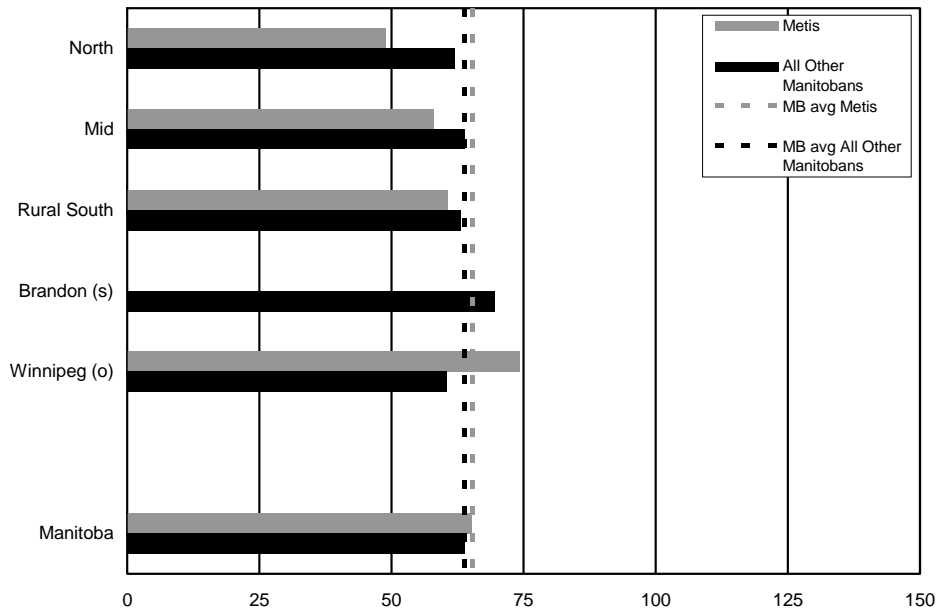
- There is no difference in rates of colorectal cancer in Metis females compared to All Other Manitoban females (57.0 vs. 53.6 per 100,000) in Manitoba

Aggregate areas:

- There is no difference in rates of colorectal cancer in Metis females compared to All Other Manitoban females at the aggregate level
- Metis females do not have any difference in rates of colorectal cancer compared to their provincial average at the aggregate level
- All Other Manitoban females have a lower rate of colorectal cancer compared to their provincial average in Winnipeg (50.1 vs. 53.6 per 100,000)

Figure 5.2.1: Rates of Colorectal Cancer by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents

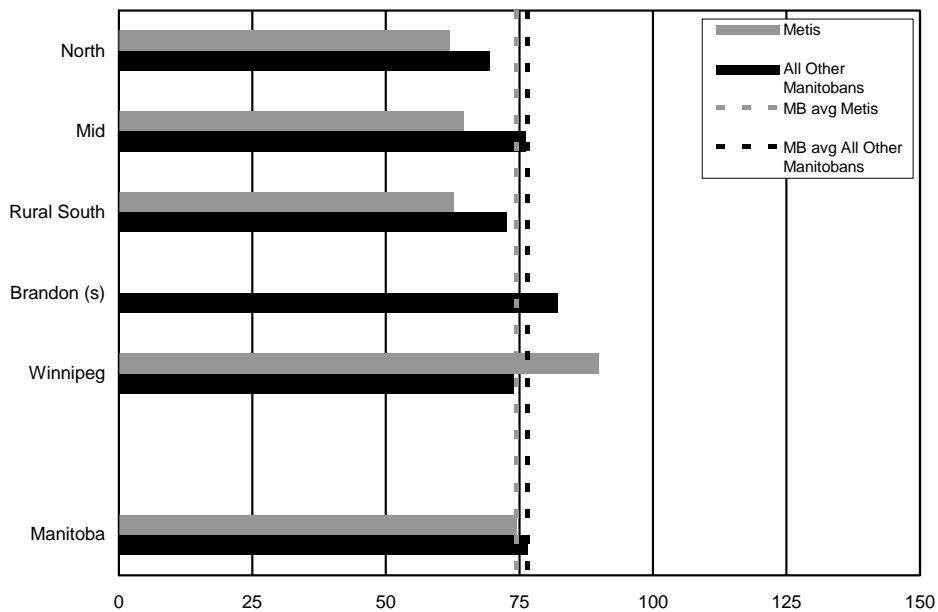


'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 5.2.2: Rates of Colorectal Cancer in Males by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents

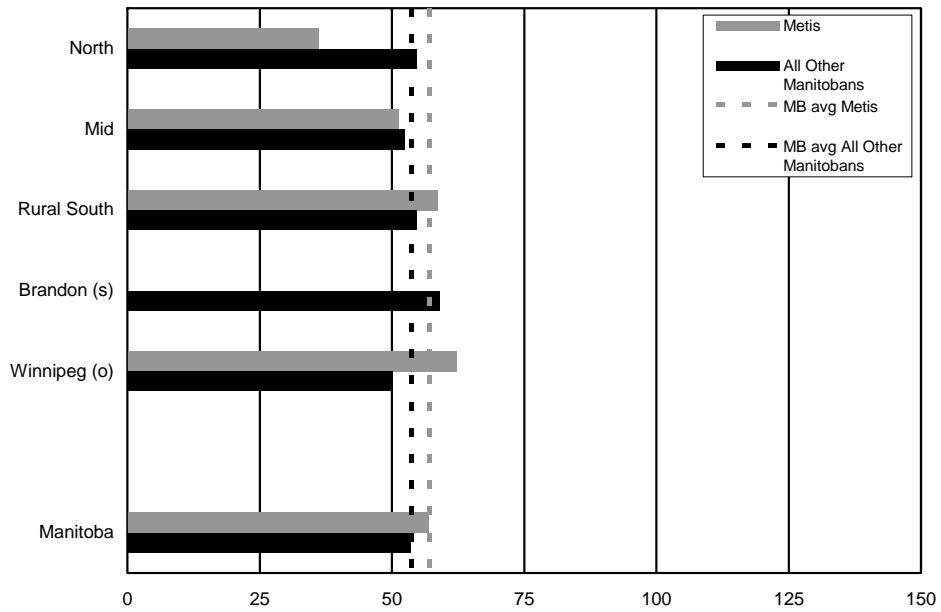


'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 5.2.3: Rates of Colorectal Cancer in Females by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

5.3 Trending

Key Observations by time period (comparing 1993-1997 and 2003-2007 periods):

Both sexes (Figure 5.3.1 and Figure 5.3.2)

Manitoba:

- Metis (48.8, 74.5, and 57.6 per 100,000) and All Other Manitobans (60.8, 64.5, and 63.3) have an increasing trend in rates of colorectal cancer in Manitoba

Aggregate areas:

- Metis have an increasing trend in rates of colorectal cancer in Winnipeg (51.0, 86.4, and 63.9 per 100,000)
- All Other Manitobans have an increasing trend in rates of colorectal cancer in North (55.7, 56.4, and 66.9 per 100,000) and Mid (53.4, 62.9, and 64.7) aggregate areas

Males (Figure 5.3.3 and Figure 5.3.4)

Manitoba:

- Metis males have no trend in rates of colorectal cancer (69.2, 92.3, and 59.7 per 100,000) in Manitoba
- All Other Manitoban males have an increasing trend in rates of colorectal cancer (72.9, 77.4, and 75.5) in Manitoba

Aggregate areas:

- Metis males have a decreasing trend in rates of colorectal cancer in Rural South aggregate area (56.8, 86.1, and 42.2 per 100,000)
- All Other Manitoban males have an increasing trend in rates of colorectal cancer in North (57.4, 62.6, and 75.3 per 100,000) and Mid (59.9, 74.7, and 77.3) aggregate areas and in Brandon (67.7, 79.3, and 85.1)

Females (Figure 5.3.5 and Figure 5.3.6)

Manitoba:

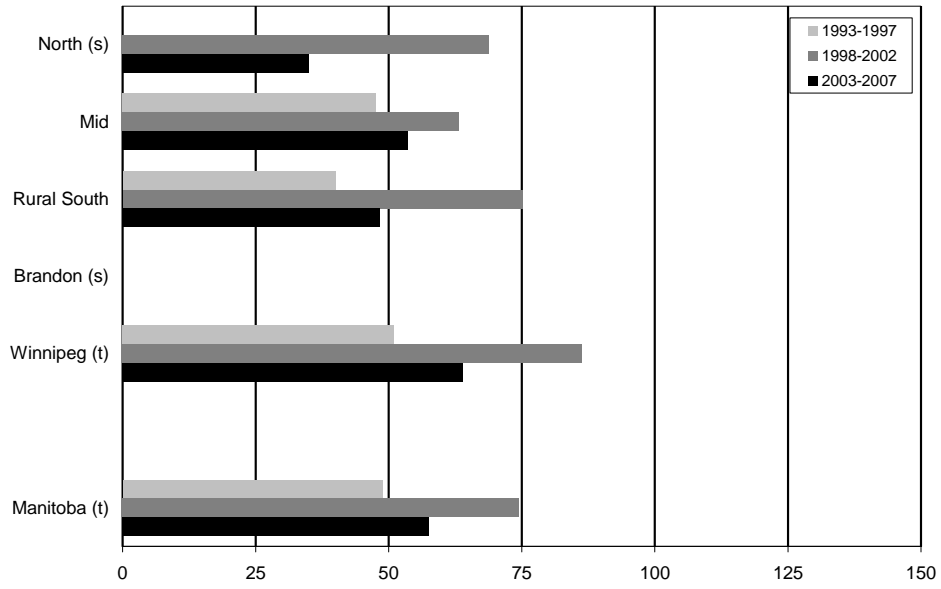
- Metis females have an increasing trend in rates of colorectal cancer (29.5, 58.4, and 55.5 per 100,000) whereas All Other Manitoban females have no trend in rates of colorectal cancer (51.1, 54.1, and 53.2) in Manitoba

Aggregate areas:

- Metis females have an increasing trend in rates of colorectal cancer in Mid aggregate area (39.8, 47.8, and 53.8 per 100,000) and in Winnipeg (24.6, 67.0, and 57.8)
- All Other Manitoban females have an increasing trend in rates of colorectal cancer in Mid aggregate area (47.6, 51.9, and 52.9 per 100,000) whereas All Other Manitoban females have a decreasing trend in rates of colorectal cancer in Rural South aggregate area (54.5, 61.0, and 48.8)

Figure 5.3.1: Rates of Colorectal Cancer in Metis by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



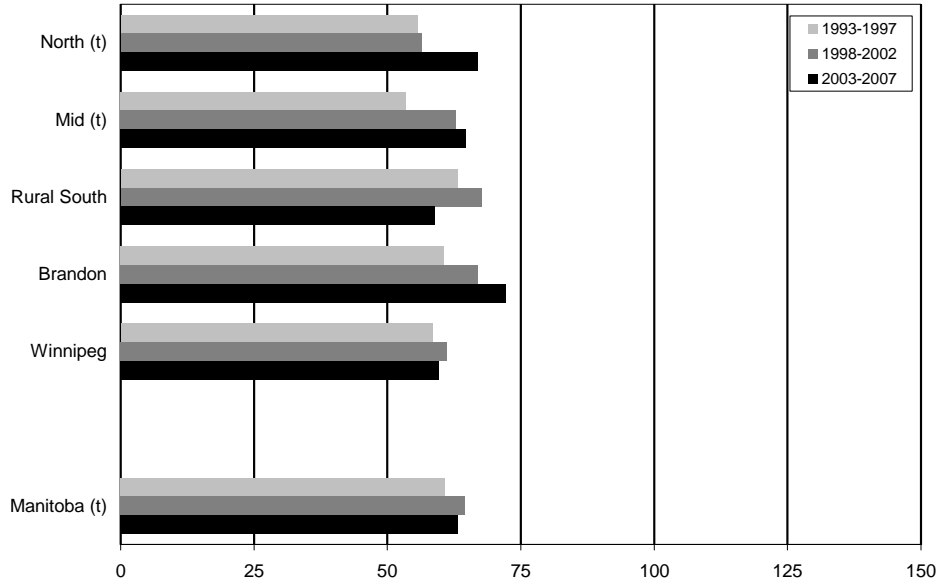
't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 5.3.2: Rates of Colorectal Cancer in All Other Manitobans by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



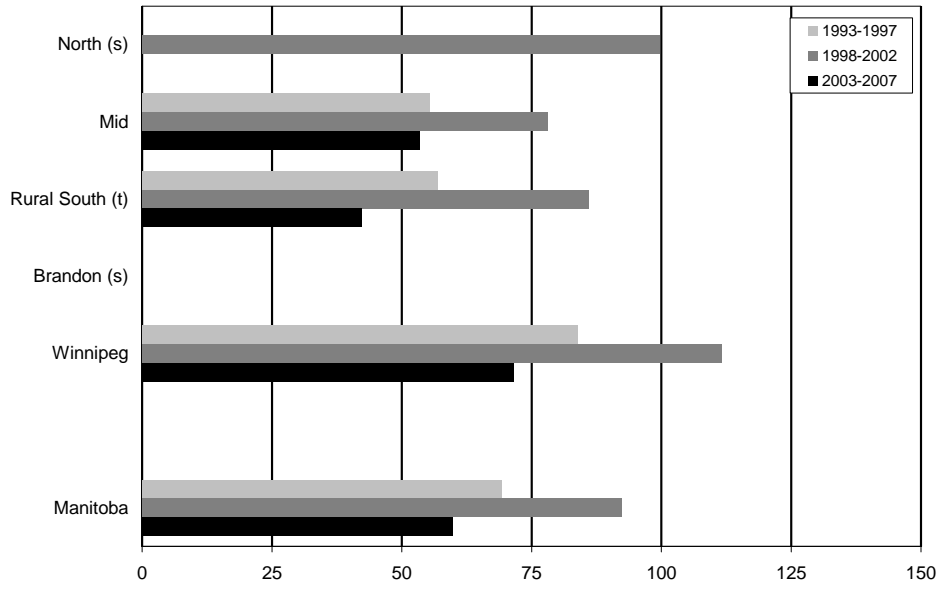
't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 5.3.3: Rates of Colorectal Cancer in Metis Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



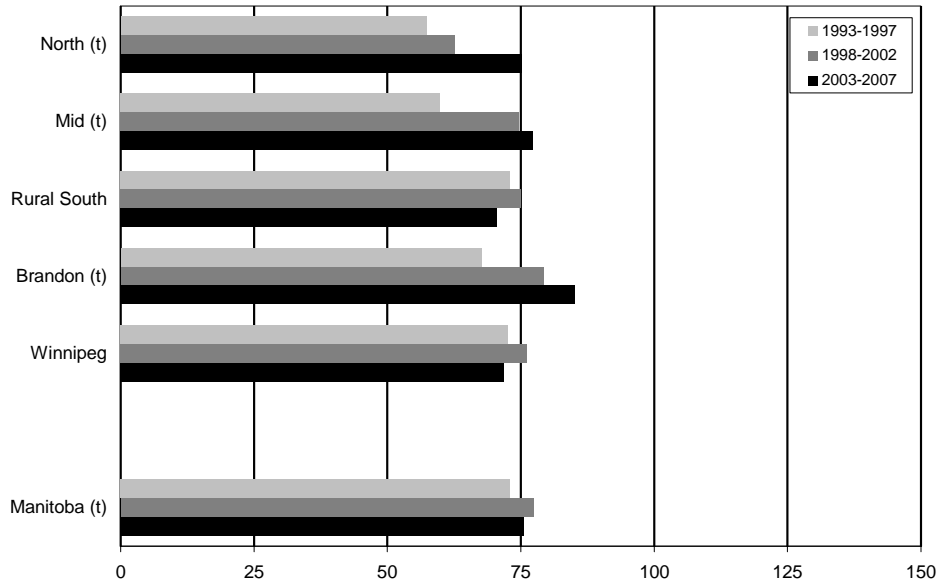
't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 5.3.4: Rates of Colorectal Cancer in All Other Manitoban Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



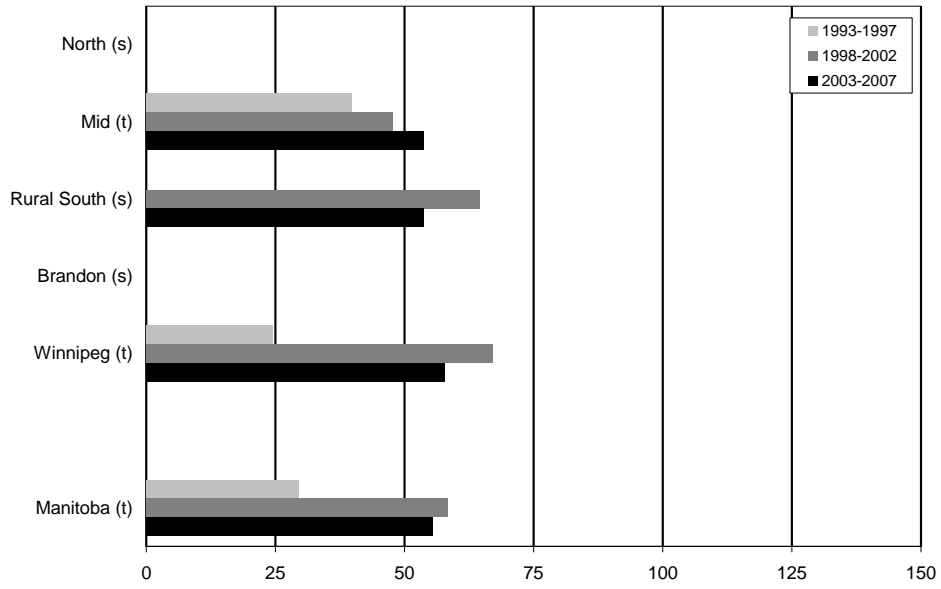
't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 5.3.5: Rates of Colorectal Cancer in Metis Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



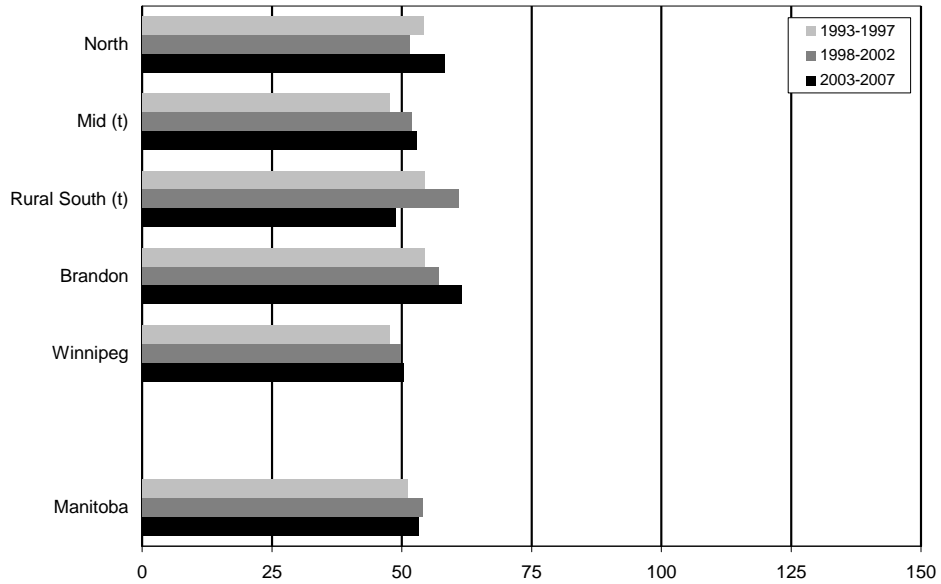
't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 5.3.6: Rates of Colorectal Cancer in All Other Manitoban Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – in italics)

Since 1975 the incidence of colorectal cancer worldwide has increased rapidly (Boyle & Langman, 2000) and now accounts for about 1 million new cases annually (Parkin, Bray, Ferlay, & Pisani, 2002). In Canada in 2010 it is estimated that there will be approximately 22,500 new cases of colorectal cancer and an incidence rate of 51 per 100,000; the expected mortality rate of 20 per 100,000 will likely result in more than 9,000 deaths from the disease in 2010 alone (Canadian Cancer Society's Steering Committee, 2010). In Manitoba, the incidence of colorectal cancer is 64.4 per 100,000 and the mortality rate is 26.2 per 100,000 (CancerCare Manitoba [CCMB], 2010). From 1988 to 2007, the incidence of colorectal cancer in this province has remained stable (CCMB, 2010). Note that the standard population for the Canadian Cancer Society's report is different than that used in CCMB studies, including this one.

There is very limited information on colorectal cancer in Metis populations. Tjepkema, Wilkins, Senécal, Guimond, & Penney (2009) reported that mortality from cancer of the 'intestine and rectum' for Métis males was significantly lower compared to non-Aboriginal male Canadians; Métis females, however, had a significantly higher mortality from 'intestine and rectum' cancer compared to non-Aboriginal female Canadians. Information in that study was limited to mortality data only from 1991 to 2001.

Risk factors for colorectal cancer are believed to be largely due to social, cultural, and lifestyle factors (Boyle & Langman, 2000). For example, dietary factors and nutritional practices such as the modern western diet, with a high intake of animal fats, have been linked to increased risk of colon cancer (Willett, Stampfer, Colditz, Rosner, & Speizer, 1990). Alcohol consumption, smoking, lack of exercise, and obesity have also been shown to increase this risk (Qasim & O'Morain, 2010), and a recent review of the literature found that individuals with diabetes are more likely to develop colorectal cancer (Huxley et al., 2009). Factors that can reduce the risk of colon cancer are increased intake of vegetables and fruits, increased physical activity, increased screening participation and access, and timeliness in contacting a physician when signs and symptoms such as changes in bowel habits are noticed (Boyle & Langman, 2000).

Reporting on results from the Canadian Community Health Survey, Martens, Bartlett, et al. (2010) found that significantly fewer Metis aged 12 years or older reported consuming five or more portions of fruits and vegetables on a daily basis compared to All Other Manitobans (20.9% vs. 30.6%). They also noted that a higher proportion of Metis reported higher levels of physical activity compared to All Other Manitobans (37.2% vs. 29.0%) (Martens, Bartlett, et al., 2010).

There is no comparable literature on rates of colorectal cancer for Metis. In our study, colorectal cancer makes up a similar proportion of all invasive cancers for both groups (13.3% vs. 13.9%). While there were no significant differences between colorectal cancer incidence Metis and All Other Manitobans, there were some notable trends in rates of colorectal cancer in our study. Comparing rates for 1993-1997 and 2002-2007 at the provincial level, rates of colorectal cancer are increasing significantly in both Metis overall (48.8, 74.5, and 57.6 per 100,000) and All Other Manitobans overall (60.8, 64.5, and 63.3), and specifically in All Other Manitoban males (72.9, 77.4, and 75.5) and in Metis females (29.5, 58.4, and 55.5). Metis males (69.2, 92.3, and 59.7 per 100,000) and All Other Manitoban females (51.1, 54.1, and 53.2) have no significant trends in rates of colorectal cancer provincially. There are significant trends Metis overall in

Winnipeg (51.0, 86.4, 63.9), for All Other Manitobans overall in North (55.7, 56.4, 66.9) and Mid (53.4, 62.9, 64.7), for Metis males in Rural South (56.8, 86.1, 42.2), for All Other Manitoban males in North (57.4, 62.6, 75.3), Mid (59.9, 74.7, 77.3), and Brandon (67.7, 79.3, 85.1), for Metis females in Mid (39.8, 47.8, 53.8) and Winnipeg (24.6, 67.0, 57.8), and for All Other Manitoban females in Mid (47.6, 51.9, 52.9) and Rural South (54.5, 61.0, 48.8).

While the lack of significant differences in rates of colorectal cancer between the Metis and All Other Manitoban populations is encouraging, increasing rates of colorectal cancer in Metis females in Winnipeg and in both Metis females and All Other Manitoban females in Mid aggregate area warrant further investigation.

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Section 6: Breast Cancer

Breast cancer is a malignant neoplasm which forms in the tissues of the breast – usually the ducts (tubes that carry milk to the nipple) and lobules (glands that make milk). Breast cancer can occur in both men and women, but is very rare in men. Breast cancer can easily spread to other areas of the body, with the lymph nodes, lungs, liver, bones, or brain most likely to be affected (Kulka & Davies, 2002).

The age-adjusted incidence of breast cancer was measured for all female residents over a ten-year period: 1998-2007. Residents were considered to have breast cancer if they met one of the following conditions:

- Incidence: ICDO-3 code C50

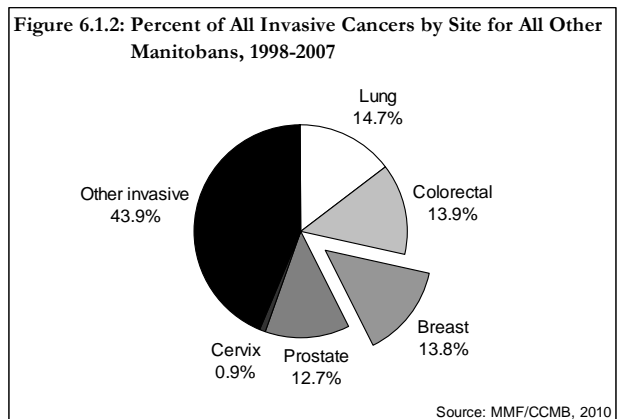
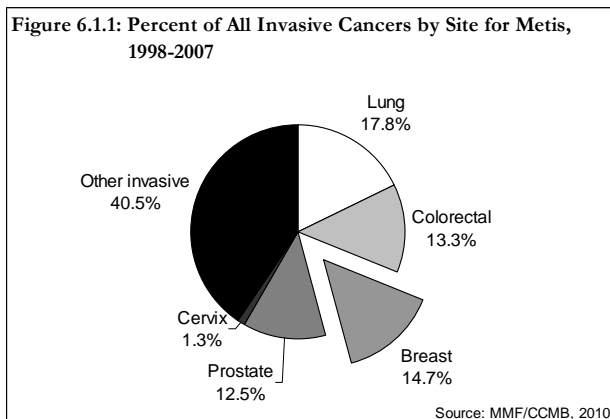
The denominator includes all female Manitoba residents as of December 31, 2007. Based on the criteria above, there were 376 Metis and 7,352 All Other Manitoban cases of breast cancer during the 1998-2007 time period.

6.1 Percent of All Invasive Cancers

Key pie chart observations:

Females (Figure 6.1.1 and Figure 6.1.2)

- Breast cancer comprised 29.4% of all the invasive cancers diagnosed for Metis females in Manitoba between 1998 and 2007. The proportion for All Other Manitoban females was similar at 28.0%



6.2 Incidence Rates

Key Observations by geography:

Females (Figure 6.2.1)

Manitoba:

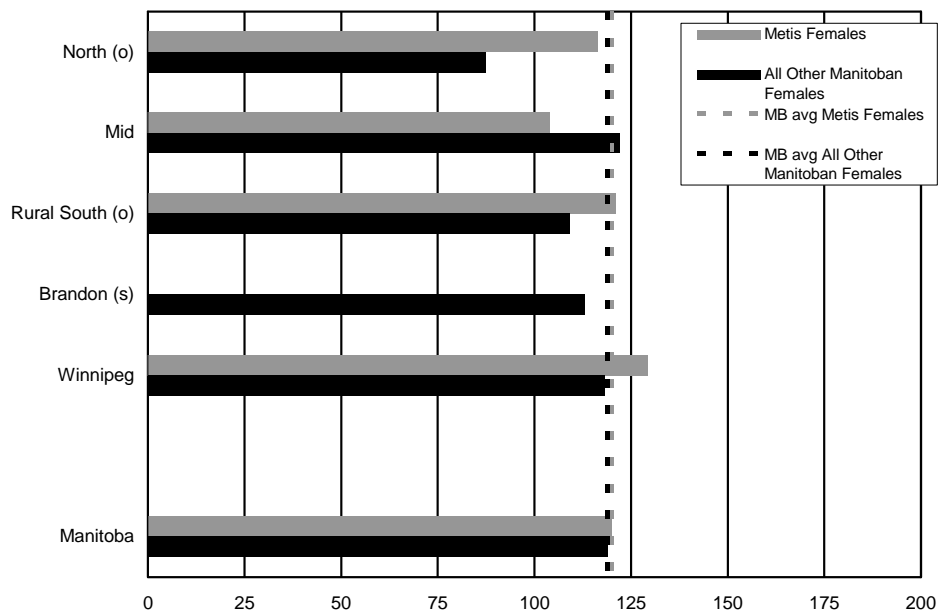
- There is no difference in rates of breast cancer in Metis females compared to All Other Manitoban females (120.0 vs. 119.0 per 100,000) in Manitoba

Aggregate areas:

- There is no difference in rates of breast cancer between Metis females compared to All Other Manitoban females at the aggregate level
- Metis females do not have any difference in rates of breast cancer compared to their provincial average at the aggregate level
- All Other Manitoban females have lower rates of breast cancer compared to their provincial average in North (87.3 vs. 119.0 per 100,000) and Rural South (109.2 vs. 119.0) aggregate areas

Figure 6.2.1: Rates of Breast Cancer by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
'd' indicates the difference between the two groups' rates was statistically significant for this area
's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

6.3 Trending

Key Observations by time period (comparing 1993-1997 and 2003-2007 periods):

Females (Figure 6.3.1 and Figure 6.3.2)

Manitoba:

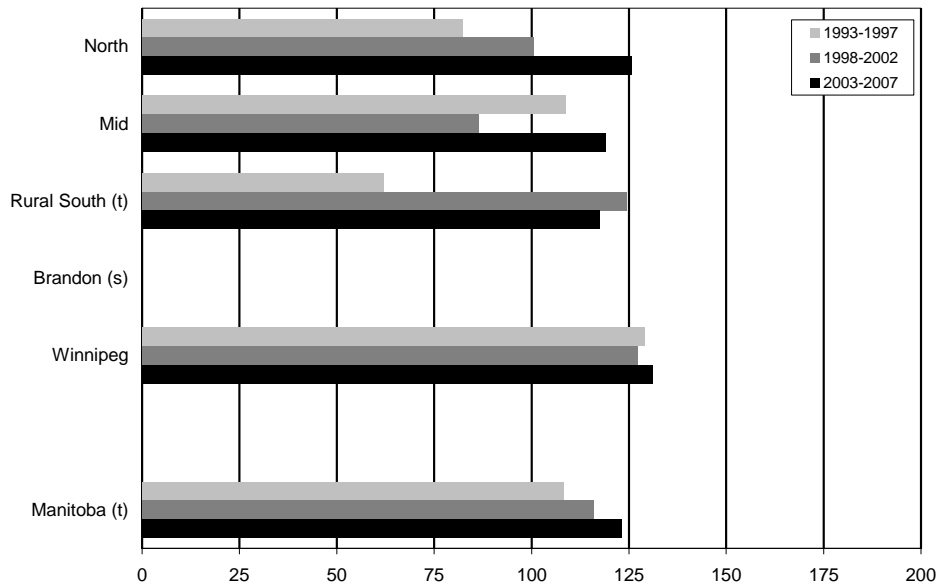
- Metis females have an increasing trend in rates of breast cancer (108.2, 115.8, and 123.1 per 100,000) in Manitoba whereas there is no trend in rates of breast cancer in All Other Manitoban females (119.3, 119.9, and 118.2)

Aggregate areas:

- Metis females have an increasing trend in rates of breast cancer in Rural South aggregate area (62.1, 124.4, and 117.5 per 100,000)
- All Other Manitoban females have an increasing trend in rates of breast cancer in Mid aggregate area (118.5, 120.2, and 123.9 per 100,000) and a decreasing trend in Brandon (127.3, 124.9, and 101.6)

Figure 6.3.1: Rates of Breast Cancer in Metis Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

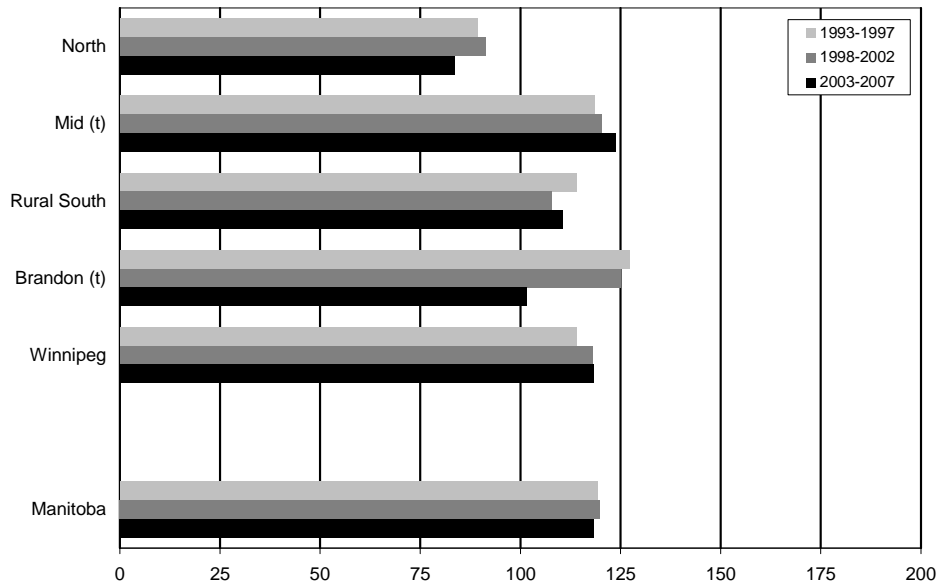


't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 6.3.2: Rates of Breast Cancer in All Other Manitoban Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – in italics):

Breast cancer is the most frequently diagnosed cancer in women in Manitoba, Canada, and worldwide (CancerCare Manitoba [CCMB], 2010; Canadian Cancer Society's Steering Committee, 2010; Parkin, Bray, Ferlay, & Pisani, 2002). Globally, breast cancer is responsible for more than 500,000 deaths per year (World Health Organization, 2009). Between 1960 and 1999 the incidence of breast cancer in Manitoba women increased 58%, from 69.6 to 109.9 per 100,000 (Demers, Turner, Mo, & Kliewer, 2005). However, CCMB reports that this incidence has remained relatively stable in Manitoba between 1988 and 2007 (CCMB, 2010).

Information on breast cancer in Metis is extremely limited. Tjepkema, Wilkins, Senécal, Guimond, & Penney (2009) observed that compared to non-Aboriginal women in Canada, Métis women had both higher rates of total cancer mortality and higher mortality at most specific cancer sites; however, breast cancer stood out as a notable exception to this trend, with no significant difference between Métis and non-Aboriginal women. Information in that study was limited to mortality data only from 1991 to 2001.

The risk of developing breast cancer increases with age, though regular screening can provide early detection (CCMB, 2010). In the past screening for breast cancer was done by breast self-examination (Elmore, Armstrong, Lehman, & Fletcher, 2005) and by mammography (Strumpf, Chai, & Kadiyala, 2010). Both approaches have received critiques in recent years. A recent meta-analysis asserted that breast self-examination (BSE) is not beneficial and in fact may be harmful (Elmore et al., 2005). These authors noted that BSE has not been found to be effective in reducing mortality related to breast cancer, although the number of breast biopsies performed has increased because of 'false-positives' (Elmore et al., 2005). The same study found that approximately 95% of women with abnormalities on screening mammograms do not have breast cancer.

Notwithstanding the controversy surrounding breast cancer screening, current Canadian breast cancer screening guidelines from the Canadian Cancer Society and the Canadian Task Force on Preventive Health Care recommend that females between the ages of 50 and 69 receive a mammogram every one or two years (Strumpf et al., 2010). In Manitoba, it is estimated that 62.5% of females aged 50-59 had a mammogram within the last two years (CCMB, 2010). In the Metis Atlas mammography rates were found to be statistically (though moderately) lower in Metis females aged 50-69 compared to All Other Manitoban females (59.5% vs. 61.8%) (Martens, Bartlett, et al., 2010). After adjusting for covariates of geographic region, age, income, continuity of care, and mental and physical comorbidities, Metis women were still less likely to have a mammogram compared to All Other Manitoban women, with an adjusted odds ratio of 0.93 (Martens, Bartlett, et al., 2010).

There is no comparable literature on incidence rates of breast cancer for Metis. In our study, breast cancer makes up a similar proportion of all invasive cancers for Metis females and All Other Manitoban females (29.4% vs. 28.0%). It is the most common type of cancer for both Metis females and All Other Manitoban females, the second most common cancer in Metis overall, and the third most common in All Other Manitobans overall (14.7% vs. 13.8%).

At both the provincial (120.0 vs. 119.0 per 100,000) and regional levels, there are no significant differences in breast cancer incidence in Metis females and All Other Manitoban females. There are several significant trends in rates of breast cancer in our study. Comparing rates for 1993-1997 and 2003-2007 at the provincial level, Metis females have a significant increasing trend in rates of breast cancer (108.2, 115.8, and 123.1 per 100,000) whereas All Other Manitoban females have no significant trend (119.3, 119.9, and 118.2). Regionally, rates of breast cancer in Metis females are increasing significantly in Rural South aggregate area (62.1, 124.4, and 117.5 per 100,000), while rates of breast cancer in All Other Manitoban females are increasing significantly in Mid aggregate area (118.5, 120.2, and 123.9) and decreasing significantly in Brandon (127.3, 124.9, and 101.6).

While rates of breast cancer in Metis females and All Other Manitoban females are fairly similar in Manitoba, several issues may be of significance for policy developers and program deliverers: rising rates of breast cancer in Metis females provincially, and specifically in Rural South aggregate area, and the lower probability of Metis women in Manitoba being screened for the disease as previously reported by Martens, Bartlett, et al. (2010).

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Section 7: Prostate Cancer

Prostate cancer originates in the tissues of the prostate – a gland in the male reproductive system found below the bladder and in front of the rectum (Canadian Cancer Society, 2010). Almost all prostate cancers begin in the epithelial cells which line the prostate and are slow-growing (Horwich, Waxman, Abel, Laniado, & Dearnaley, 2010). Prostate cancer can spread into both lobes of the prostate gland and, if undetected, to nearby tissues such as the seminal vesicles, rectum, bladder and lymph nodes (Horwich et al., 2010).

The age-adjusted incidence of prostate cancer was measured for all male residents in a ten-year period: 1998-2007. Residents were considered to have prostate cancer if they met one of the following conditions:

- Incidence: ICDO-3 code C61.9

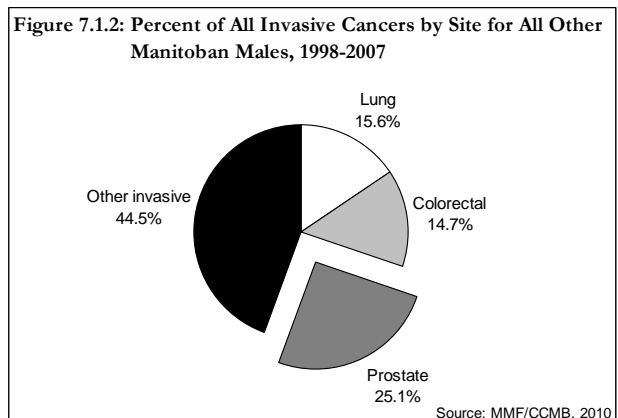
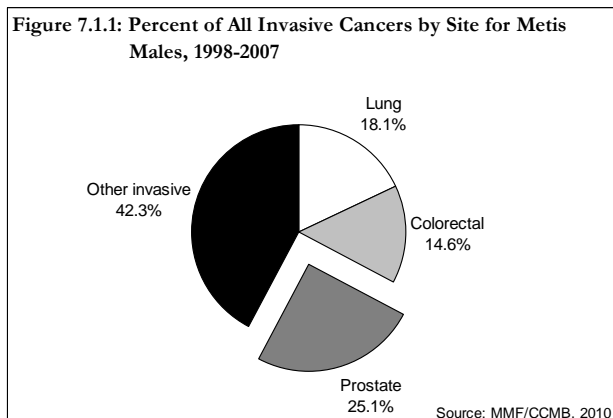
The denominator includes all male Manitoba residents as of December 31, 2007. Based on the criteria above, there were 319 Metis and 6,756 All Other Manitoban cases of prostate cancer during the 1998-2007 time period.

7.1 Percent of All Invasive Cancers

Key pie chart observations:

Males (Figure 7.1.1 and Figure 7.1.2)

- Prostate cancer comprised 25.1% of all the invasive cancers diagnosed for Metis males in Manitoba between 1998 and 2007. The proportion for All Other Manitoban males was the same at 25.1%.



7.2 Incidence Rates

Key Observations by geography:

Males (Figure 7.2.1)

Manitoba:

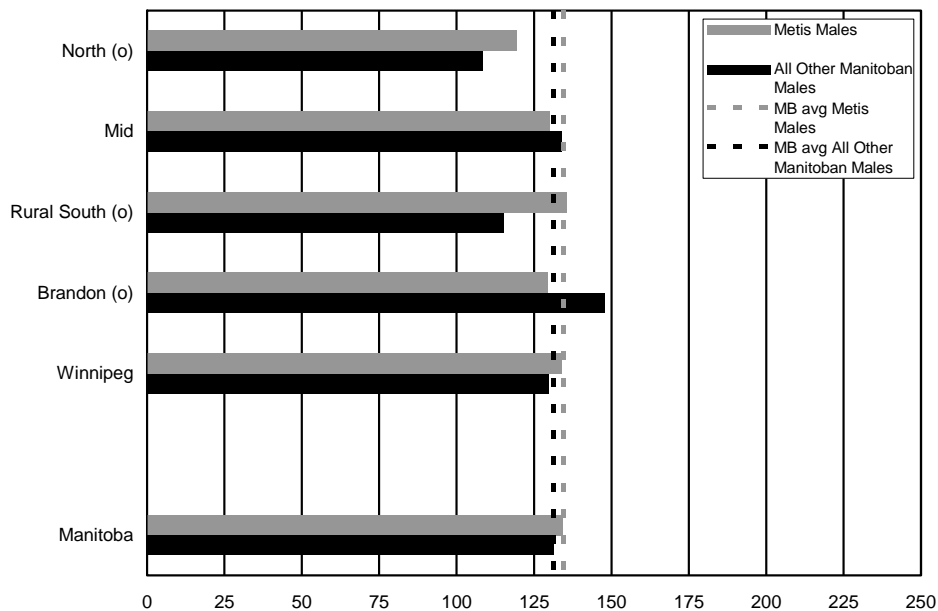
- There is no difference in rates of prostate cancer in Metis males compared to All Other Manitoban males (134.4 vs. 131.3 per 100,000) in Manitoba

Aggregate areas:

- There is no difference in rates of prostate cancer in Metis males compared to All Other Manitoban males at the aggregate level
- Metis males do not have any difference in rates of prostate cancer compared to their provincial average at the aggregate level
- All Other Manitoban males in Brandon (147.9 vs. 131.3 per 100,000) have a higher rate of prostate cancer compared to their provincial average whereas All Other Manitoban males in North (108.4 vs. 131.3) and Rural South (115.2 vs. 131.3) aggregate areas have a lower rate of prostate cancer compared to their provincial average

Figure 7.2.1: Rates of Prostate Cancer in Males by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis

'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans

'd' indicates the difference between the two groups' rates was statistically significant for this area

's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

7.3 Trending

Key Observations by time period (comparing 1993-1997 and 2003-2007 periods):

Males (Figure 7.3.1 and Figure 7.3.2)

Manitoba:

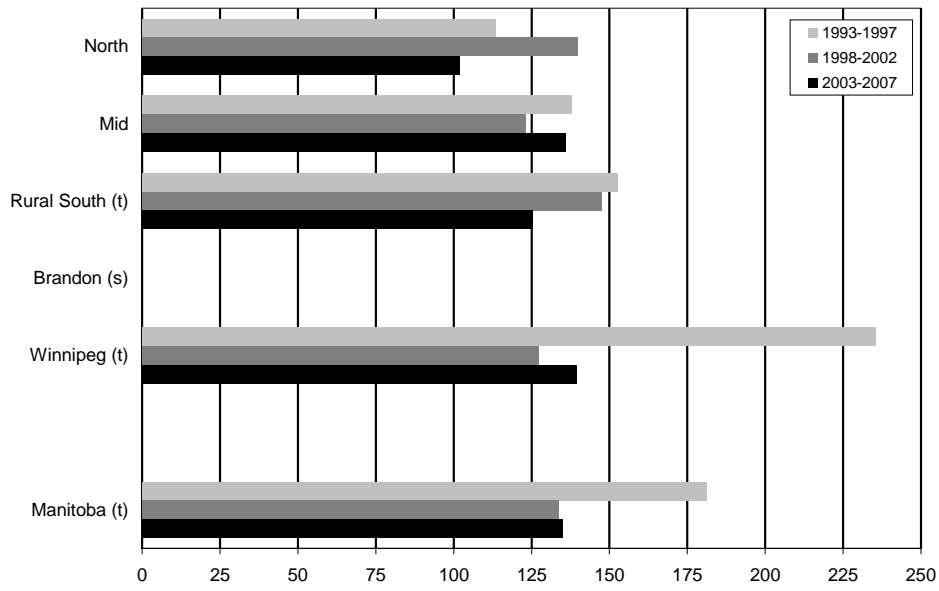
- There is a decreasing trend in rates of prostate cancer in both Metis males (181.1, 133.7, and 135.1 per 100,000) and All Other Manitoban males (164.5, 142.2, and 120.8) in Manitoba

Aggregate areas:

- Metis males have a decreasing trend in rates of prostate cancer in Rural South aggregate area (152.8, 147.5, and 125.3 per 100,000) and in Winnipeg (235.6, 127.2, and 139.5)
- All Other Manitoban males have decreasing trends in rates of prostate cancer in all areas: North (158.6, 110.8, and 106.3 per 100,000), Mid (168.2, 143.3, and 124.7), and Rural South (158.5, 123.6, and 107.4) aggregate areas as well as in Brandon (167.9, 174.4, and 121.3) and Winnipeg (154.4, 141.0, and 118.7)

Figure 7.3.1: Rates of Prostate Cancer in Metis Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

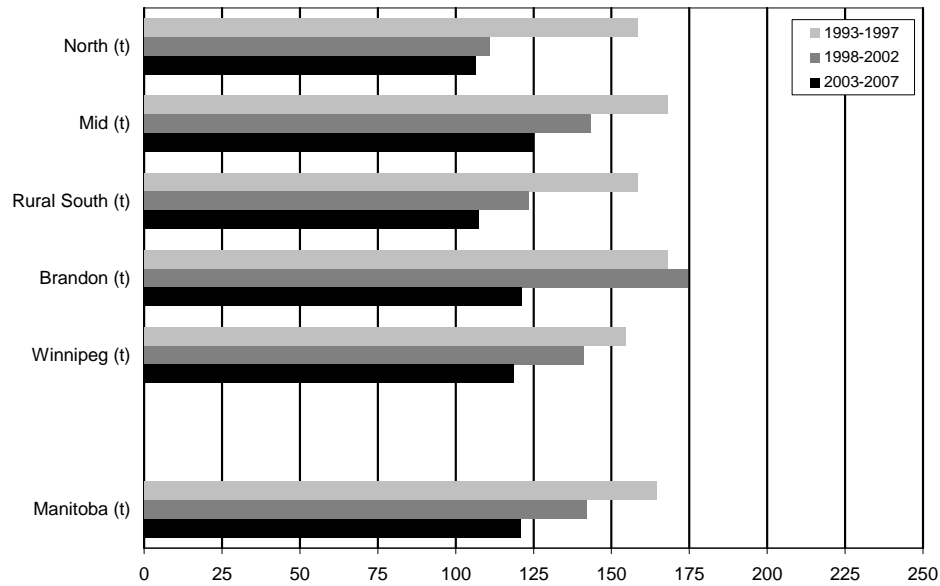


't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB 2010

Figure 7.3.2: Rates of Prostate Cancer in All Other Manitoban Males by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – *in italics*):

Prostate cancer is the most common cancer diagnosed in men in Canada, accounting for 27.4% of all new cancer diagnoses in Canadian men; however, only 10.8% of all male cancer deaths in the country are from this disease (Canadian Cancer Society's Steering Committee, 2010). In Manitoba the age-standardized incidence of prostate cancer for 2010 is projected to be 117 per 100,000 men (CancerCare Manitoba [CCMB], 2010), compared to a national rate of 123 per 100,000 men (Canadian Cancer Society's Steering Committee, 2010). Incidence rates of prostate cancer in Manitoba have been declining since the late 1990s – a pattern which continues to this day (CCMB, 2010). Note that the standard population for the Canadian Cancer Society's report is different than that used in CCMB studies, including this one.

Information on prostate cancer in Metis is minimal. Tjepkema, Wilkins, Senécal, Guimond, & Penney (2009) recently demonstrated that mortality from prostate cancer among Canadian Métis was approximately equal to that of the non-Aboriginal population. However, that study was limited to mortality data only from 1991 to 2001.

In the late 1980s and early 1990s, screening for prostate cancer in men over 50 years of age was done through a digital rectal exam (DRE) and/or a prostate-specific antigen (PSA) test – a blood exam used to detect the presence of prostate cancer (CCMB, 2010; Ilic, O'Connor, Green, & Wilt, 2007). As a result, the incidence of prostate cancer in Manitoba increased significantly in the early 1990s. However, the lack of evidence for any life-saving effects of these screening methods, in addition to concerns about overdiagnosis and overtreatment (many men live with prostate cancer for years with no noticeable ill effects), led to considerable controversy among researchers, health care providers, and other key stakeholders by the mid-1990s (Barry, 2009; Ilic et al., 2007). The uncertainty surrounding the DRE and PSA test led to a significant drop in prostate cancer incidence after 1993 in Manitoba, with rates reaching levels close to pre-DRE/PSA test levels by the late 1990s (CCMB, 2010). As our study assesses trends in prostate cancer incidence as early as 1993, this context is crucial to interpreting data measuring prostate cancer in Manitoba Metis.

The controversy over prostate cancer screening using DREs and PSA testing continues. The results of two important studies comparing the mortality rates of men who received the DRE and/or PSA tests with men who did not have not resolved the debate: one found no difference in mortality rates between the two groups (Andriole et al., 2009) and the other found a 20% reduced mortality rate but a high risk of overdiagnosis (Schröder et al., 2009). Currently CCMB and other authorities recommend that health care professionals make patients aware of the benefits and risks of prostate screening so individuals affected can make an informed choice (Canadian Cancer Society/National Cancer Institute of Canada, 2006; CCMB, 2011; National Cancer Institute, 2010).

There is no comparable literature on rates of prostate cancer for Metis. In our study prostate cancer makes up a similar proportion of all invasive cancers for Metis males and All Other Manitoban males (25.1% vs. 25.1%). It is the most common invasive cancer for both Metis males and All Other Manitoban males and the fourth most common cancer in Metis overall and All Other Manitobans overall (12.5% vs. 12.7%).

There are no significant differences in rates of prostate cancer between Metis males and All Other Manitoban males at the provincial (134.4 vs. 131.3 per 100,000) or regional levels. Metis males are not significantly more or less likely to be diagnosed with prostate cancer in any specific area, though All Other Manitoban males are more likely to be diagnosed with prostate cancer in Brandon (147.9 vs. 131.3 per 100,000), and less likely to be diagnosed in North (108.4 vs. 131.3) and Rural South (115.2 vs. 131.3) aggregate areas.

Comparing rates for 1993-1997 and 2003-2007 at the provincial level, both Metis males (181.1, 133.7, and 135.1 per 100,000) and All Other Manitoban males (164.5, 142.2, and 120.8) have significant decreasing trends in rates of prostate cancer. This is also true for Metis males in Rural South aggregate area (152.8, 147.5, and 125.3 per 100,000) and in Winnipeg (235.6, 127.2, and 139.5), and for All Other Manitoban males in every area: North (158.6, 110.8, and 106.3), Mid (168.2, 143.3, and 124.7), and Rural South (158.5, 123.6, and 107.4) aggregate areas, as well as Brandon (167.9, 174.4, and 121.3) and Winnipeg (154.4, 141.0, and 118.7).

Significant decreasing trends in both Metis males and All Other Manitoban males may reflect a decreasing trend in screening for prostate cancer. The lack of a decreasing trend in rates of prostate cancer in Metis males in North and Mid aggregate areas may indicate issues concerning a lack of patient awareness that warrant further investigation.

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Tjepkema, M., Wilkins, R., Senécal, S., Guimond, É., & Penney, C. (2009). Mortality of Métis and registered Indian adults in Canada: An 11-year follow-up study. *Health Reports*, 20(4), 31-51.

Section 8: Cervical Cancer

Cervical cancer starts in the cells of the cervix – the narrow passageway that connects the uterus to the vagina. It is a malignant disease caused by abnormal cell growth of surface cells of the cervix (Duarte-Franco & Franco, 2004).

The age-adjusted incidence of cervical cancer was measured for all female residents over a ten-year period: 1998-2007. The denominator includes all female Manitoba residents as of December 31, 2007. Residents were considered to have cervical cancer if they met one of the following conditions:

- Incidence: ICDO-3 code C53 with invasive morphology

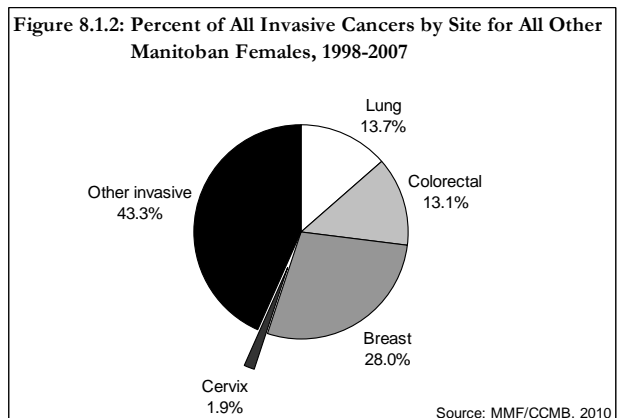
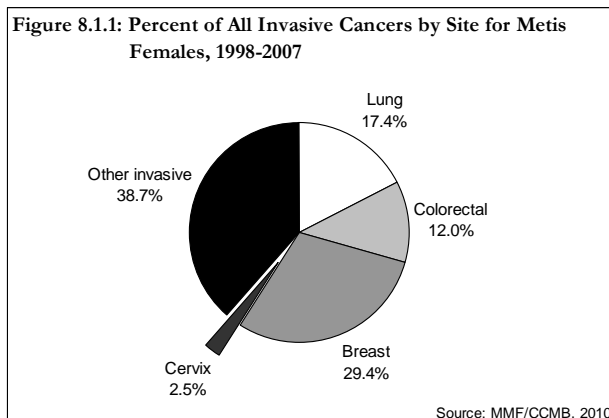
The denominator includes all female Manitoba residents as of December 31, 2007. Based on the criteria above, there were 32 Metis and 492 All Other Manitoban cases of cervical cancer during the 1998-2007 time period.

8.1 Percent of All Invasive Cancers

Key pie chart observations:

Females (Figure 8.1.1 and Figure 8.1.2)

- Cervical cancer comprised 2.5% of all the invasive cancers diagnosed for Metis females in Manitoba between 1998 and 2007. The proportion for All Other Manitoban females was similar at 1.9%.



8.2 Incidence Rates

Key Observations by geography:

Females (Figure 8.2.1)

Manitoba:

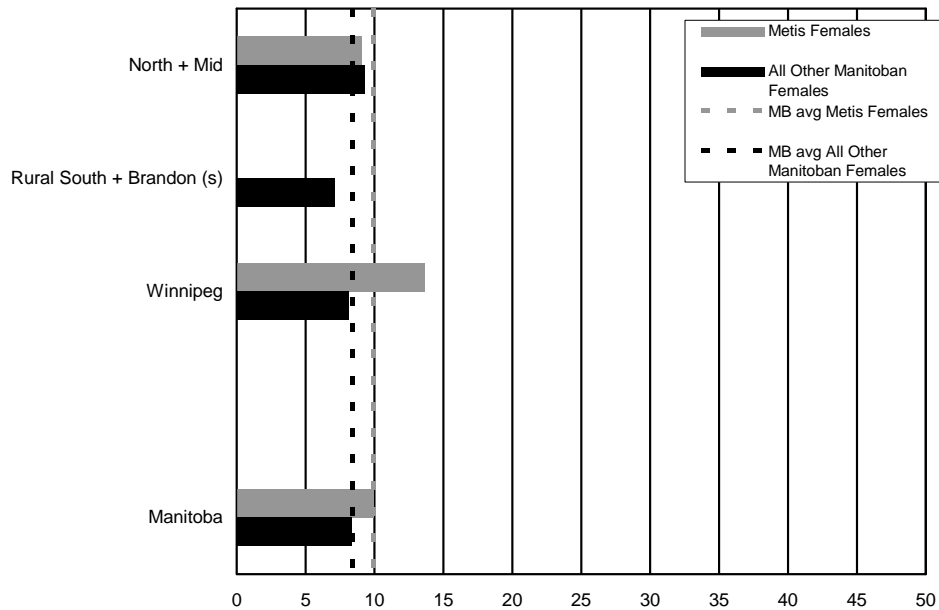
- There is no difference in the rates of cervical cancer in Metis females compared to All Other Manitoban females (10.0 vs. 8.4 per 100,000) in Manitoba

Aggregate areas:

- There is no difference in rates of cervical cancer in Metis females compared to All Other Manitoban females at the aggregate level
- There is no difference in rates of cervical cancer in Metis females compared to their provincial average at the aggregate level
- There is no difference in rates of cervical cancer in All Other Manitoban females compared to their provincial average at the aggregate level

Figure 8.2.1: Rates of Cervical Cancer by Aggregate RHA, 1998-2007

Ten-year average age-standardized incidence rates per 100,000 residents



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

8.3 Trending

Key Observations by time period (comparing 1993-1997 and 2003-2007 periods):

Females (Figure 8.3.1 and Figure 8.3.2)

Manitoba:

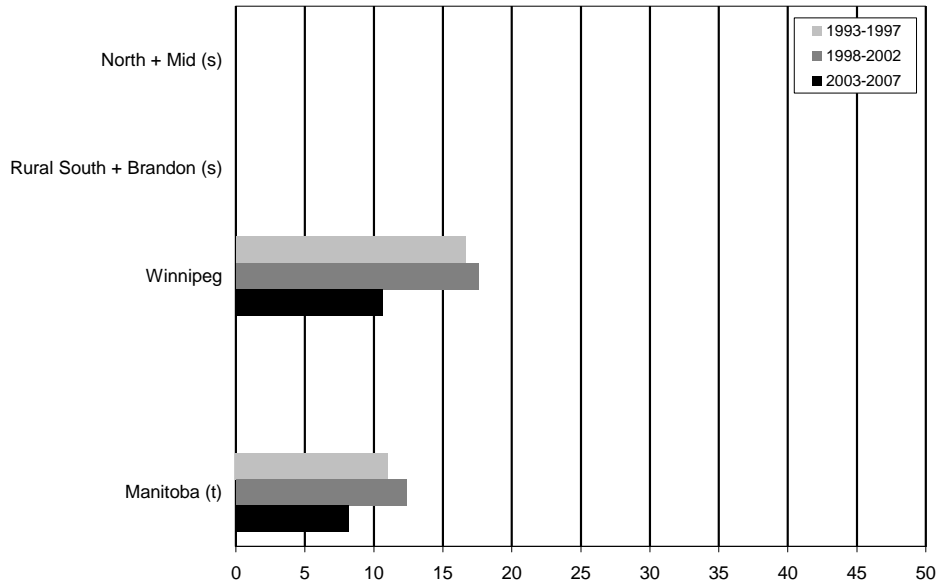
- There is a decreasing trend in rates of cervical cancer in both Metis females (11.0, 12.3, and 8.2 per 100,000) and All Other Manitoban females (9.6, 8.6, and 8.2) in Manitoba

Aggregate areas:

- Metis females do not have a trend in rates of cervical cancer at the aggregate level
- All Other Manitoban females have a decreasing trend in rates of cervical cancer in the North/Mid aggregate area (12.6, 8.7, and 9.9 per 100,000)

Figure 8.3.1: Rates of Cervical Cancer in Metis Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents

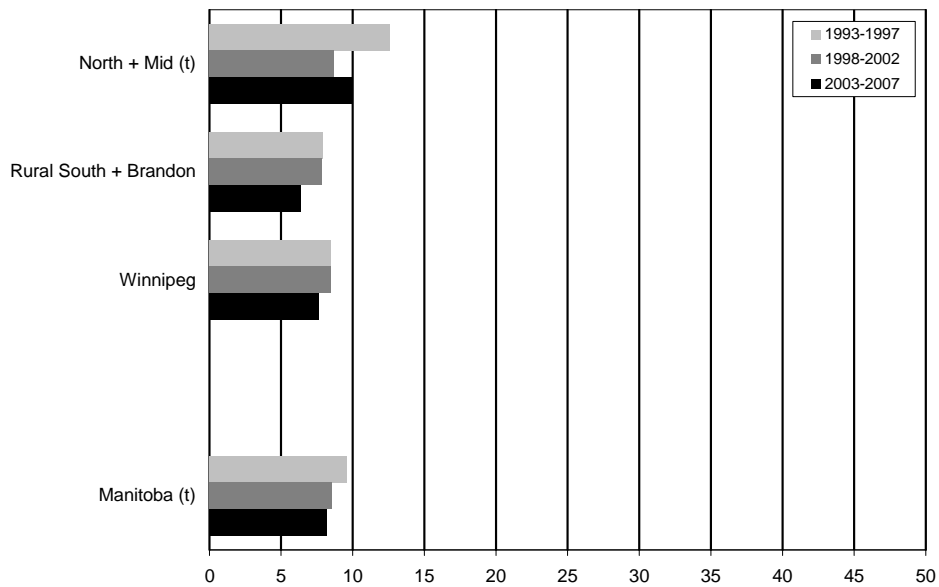


't' indicates the trend for Metis comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Figure 8.3.2: Rates of Cervical Cancer in All Other Manitoban Females by Aggregate RHA and Time Period

Five-year average age-standardized incidence rates per 100,000 residents



't' indicates the trend for All Other Manitobans comparing the earliest period (1993-1997) to the most recent period (2003-2007) was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – *in italics*):

It is estimated that there will be 1300 new cases of cervical cancer in Canada in 2010, with an age-standardized incidence rate of 7 per 100,000 (Canadian Cancer Society's Steering Committee, 2010). In that same year, it is estimated that 370 women will die from the disease (Canadian Cancer Society's Steering Committee, 2010). On average, each woman dying from cervical cancer in Canada loses 26 years of her life (Duarte-Franco & Franco, 2004).

Current recommendations for primary prevention of cervical cancer are through immunization against genital human papillomavirus (HPV). Cervical cancer is also very amenable to secondary prevention, or screening, through Papanicalou ('Pap') testing (Duarte-Franco & Franco, 2004). It has been demonstrated that regular 'Pap testing' can reduce cervical cancer mortality by close to 80% (Peto, Gilham, Fletcher, & Matthews, 2004).

The Metis Atlas (Martens, Bartlett, et al., 2010) reported similar rates of cervical cancer screening in Metis (69.0%) and All Other Manitoban females (67.8%) aged 18-69. In Winnipeg, where more than 40% of Metis in Manitoba reside, 75.0% of Metis females were screened for cervical cancer compared to 70.9% of All Other Manitoban females. Metis females in three Winnipeg Community Areas had higher rates of pap testing: Seven Oaks, Inkster, and Downtown. Logistic regression modeling in that study revealed that after adjusting for area of residence, age, income, and mental and physical comorbidities, Metis females were more likely than All Other Manitoban females to be screened for cervical cancer (aOR=1.25, 95% CI 1.21-1.29). Moreover, Metis females were more likely to have a Pap test if they lived in a neighborhood with a high household income (aOR=1.14, 95% CI 1.12-1.16) or had a mental co-morbidity (aOR=1.41, 95% CI 1.31-1.52) or a physical co-morbidity (aOR=1.12, 95% CI 1.04-1.20) (Martens, Bartlett, et al., 2010).

There is no comparable literature on rates of cervical cancer in Metis. In our study, cervical cancer makes up a small proportion of all invasive cancers for Metis females and All Other Manitoban females (2.5% vs. 1.9%). These similar proportions are also evident in the incidence data, where there are no significant differences between rates of cervical cancer in Metis females and All Other Manitoban females at the provincial (10.0 vs. 8.4 per 100,000) and regional levels. There are also no aggregate areas where Metis females or All Other Manitoban females are statistically more or less likely to be diagnosed with cervical cancer.

Comparing rates for 1993-1997 and 2003-2007 at the provincial level, both Metis females (11.0, 12.3, and 8.2 per 100,000) and All Other Manitoban females (9.6, 8.6, and 8.2) have a significant decreasing trend in rates of cervical cancer. While there are no significant trends in Metis females at the aggregate level (information outside Winnipeg is suppressed due to small numbers), there is a significant decreasing trend in the rates of cervical cancer in All Other Manitoban females in the combined North/Mid aggregate area (12.6, 8.7, and 9.9 per 100,000).

Decreasing rates of cervical cancer in Manitoba for both Metis females and All Other Manitoban females are encouraging. While this trend is not evident in all areas for both groups, it is possible that the small number of cases limit conclusive trending. While not statistically significant, Metis females in Winnipeg (16.6, 17.6, and 10.7 per 100,000) and All Other Manitoban females in Rural South/Brandon (7.9, 7.8, and 6.4) and Winnipeg (8.5, 8.5, and 7.7) all show a decrease in rates between 1993-1997 and 2003-2007. High rates of

cervical cancer screening are an important contributor to the decreasing rates of cervical cancer. Ongoing support for screening initiatives throughout the province should be sustained.

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Section 9: Stage at Diagnosis

When cancer is diagnosed, staging tests help determine how far the disease has progressed. The specific cancer stage is determined based on the size of the tumor and the extent of the cancer's spread to local tissues, the lymph nodes, and the rest of the body (Canadian Cancer Society [CCS], 2011; Mitta, 2002; National Cancer Institute, 2010). Staging is important as it allows physicians to determine the most appropriate treatment, provide an estimate of prognosis or chance of recovery (patients with late-stage cancers generally have the poorest prognoses), and evaluate a treatment's effectiveness (CCS, 2011; National Cancer Institute, 2010). CancerCare Manitoba (CCMB) was the first in Canada to provide cancer staging at diagnosis for all possible cancers, launching its collaborative stage data collection system in 2004 (CCMB, 2011).

In this study stage at diagnosis of cancer was measured as a crude percent of all residents with cancer over a four-year period: 2004-2007. This time period coincides with the comprehensive capture of stage data on a population-wide basis in the Manitoba Cancer Registry, effective January 1, 2004.

The denominator includes all Manitoba residents diagnosed with cancer between January 1, 2004, and December 31, 2007. Some data are suppressed due to a very small number of cases.

9.1 Percent of Individuals with Cancer by Stage

Key observations:

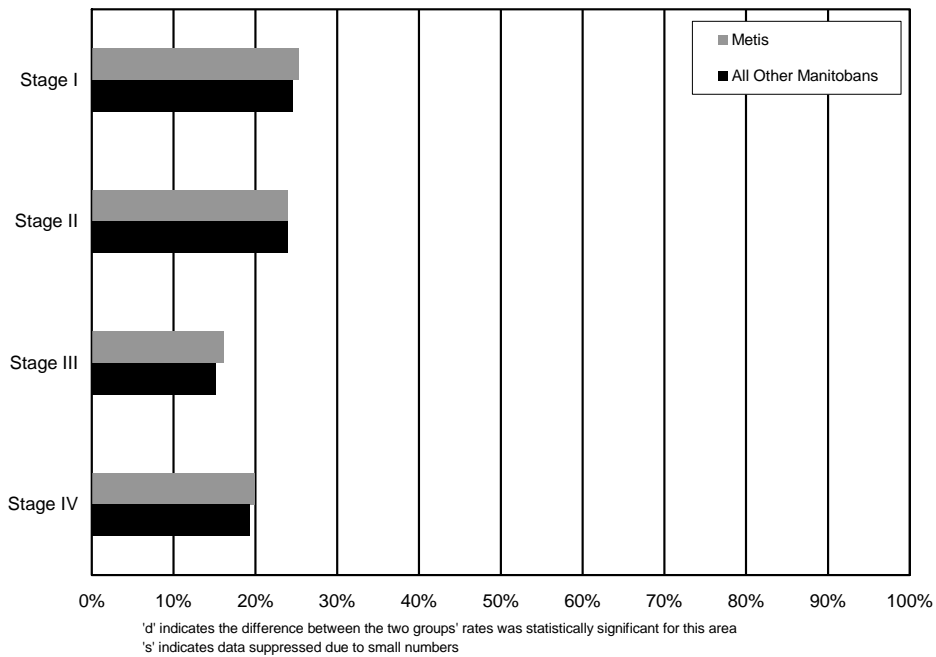
Both sexes (Figure 9.1.1 to Figure 9.1.6)

- Overall, Metis and All Other Manitobans have the same distribution of cancer stage at diagnosis, with no significant difference between the two groups
- All Invasive Cancer: There is no statistical difference in the stage at which Metis and All Other Manitobans were diagnosed with all invasive cancer: Stage I (25.3% vs. 24.5%), Stage II (23.9% vs. 24.0%), Stage III (16.1% vs. 15.2%), and Stage IV (19.9% vs. 19.4%)
- Lung Cancer: There is no statistical difference in the stage at which Metis and All Other Manitobans were diagnosed with lung cancer: Stage I (19.0% vs. 21.2%), Stage II (6.5% vs. 5.5%), Stage III (25.9% vs. 25.0%), and Stage IV (42.6% vs. 40.5%)
- Colorectal Cancer: There is no statistical difference in the stage at which Metis and All Other Manitobans were diagnosed with colorectal cancer: Stage I (18.6% vs. 19.5%), Stage II (24.0% vs. 26.9%), Stage III (28.7% vs. 26.9%), and Stage IV (22.5% vs. 20.5%)
- Breast Cancer: Although there are no statistical differences between the two groups, it appears that Metis females may tend to be diagnosed with breast cancer at an earlier stage than All Other Manitoban females: Stage I (45.4% vs. 40.6%), Stage II (36.1% vs. 37.0%), Stage III (12.8% vs. 13.5%), and Stage IV (data suppressed due to very few cases) vs. 5.5%)

- Prostate Cancer: There is no statistical difference in the stage at which Metis males and All Other Manitoban males were diagnosed with prostate cancer: Stage I or II (73.3% vs. 74.5%), Stage III (11.1% vs. 8.4%), and Stage IV (11.9% vs. 11.9%)
- Cervical Cancer: There is no statistical difference in the stage at which Metis females and All Other Manitoban females were diagnosed with cervical cancer: Stage I or II (81.8% vs. 64.1%), Stage III (data suppressed due to very few cases vs. 19.5%), and Stage IV (0.0% vs. 10.8%). While the rate for Metis in Stage I appear much higher than that for All Other Manitobans, this data is based on very small numbers and could vary widely.

Figure 9.1.1: Percent of Individuals with All Invasive Cancers by Stage, 2004-2007

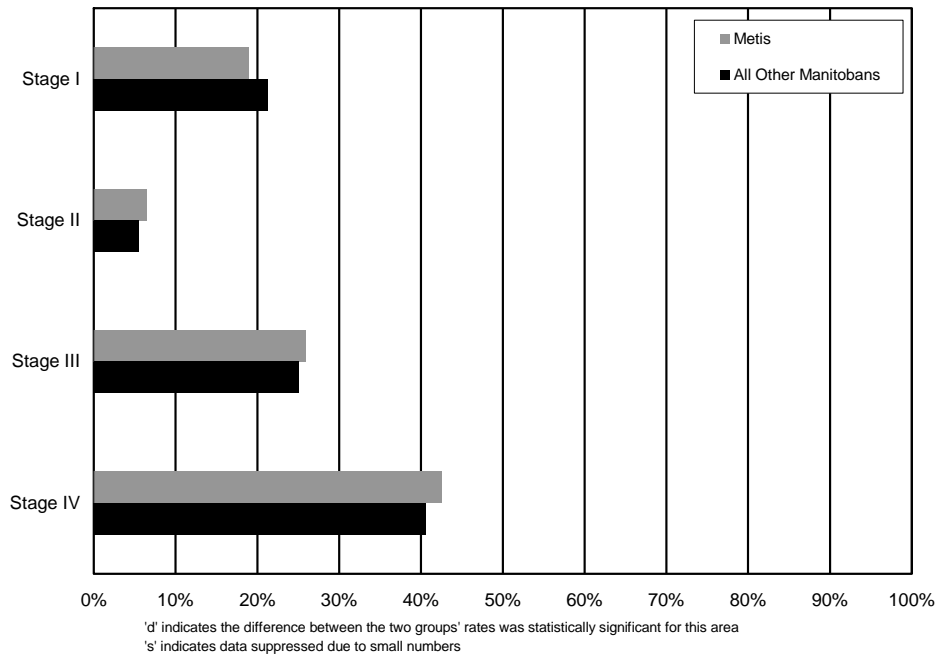
Four-year crude percentages of residents with all invasive cancers



Source: MMF/CCMB, 2010

Figure 9.1.2: Percent of Individuals with Lung Cancer by Stage, 2004-2007

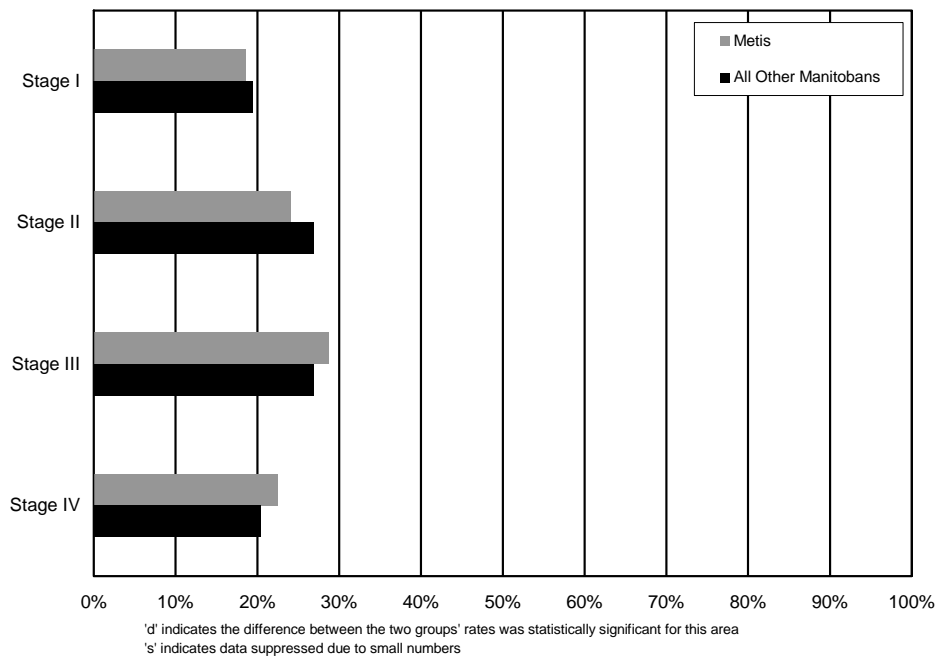
Four-year crude percentages of residents with lung cancer



Source: MMF/CCMB, 2010

Figure 9.1.3: Percent of Individuals with Colorectal Cancer by Stage, 2004-2007

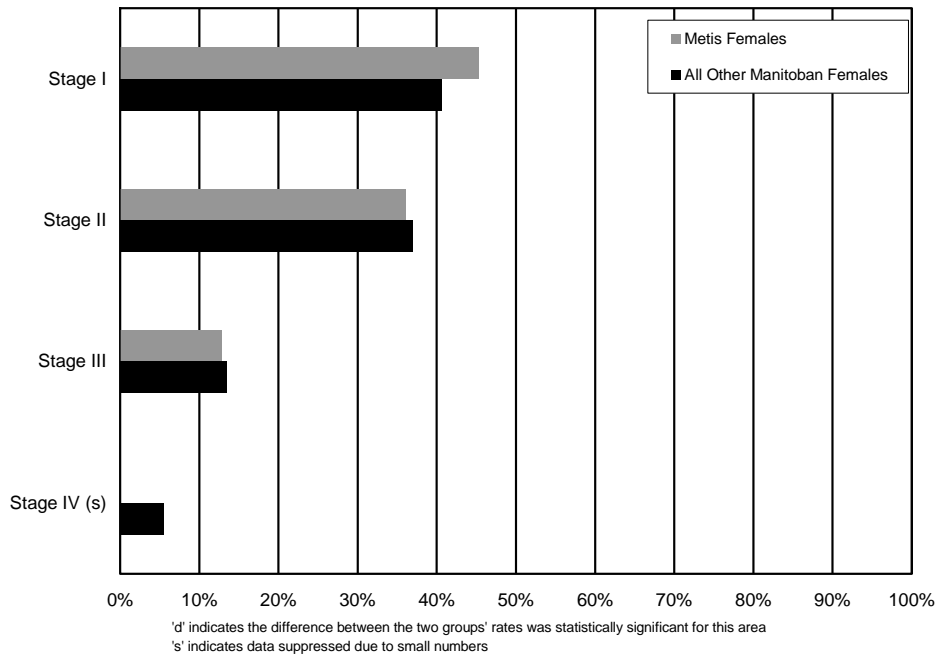
Four-year crude percentages of residents with colorectal cancer



Source: MMF/CCMB, 2010

Figure 9.1.4: Percent of Females with Breast Cancer by Stage, 2004-2007

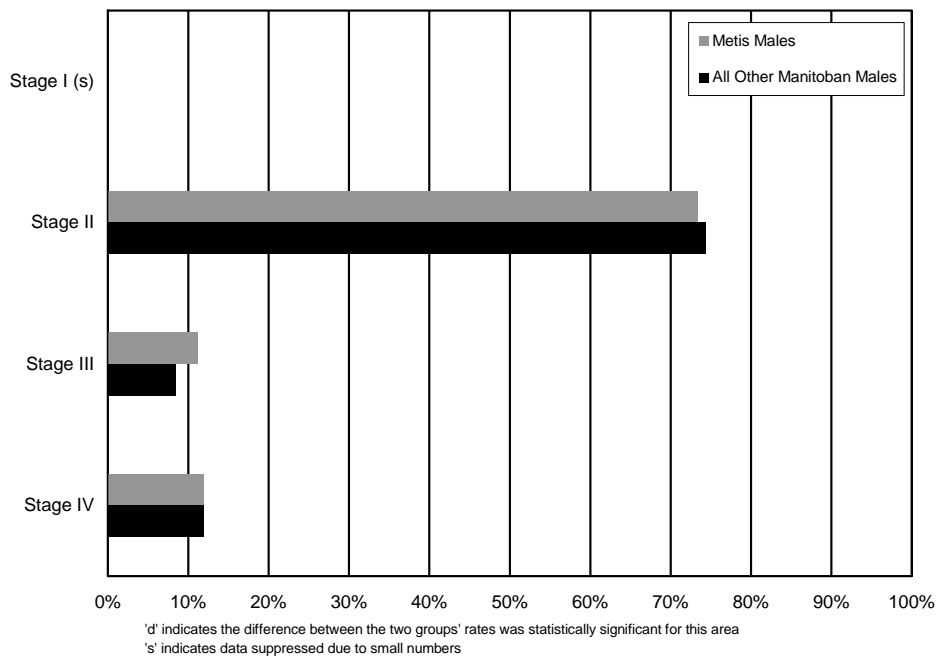
Four-year crude percentages of female residents with breast cancer



Source: MMF/CCMB, 2010

Figure 9.1.5: Percent of Males with Prostate Cancer by Stage, 2004-2007

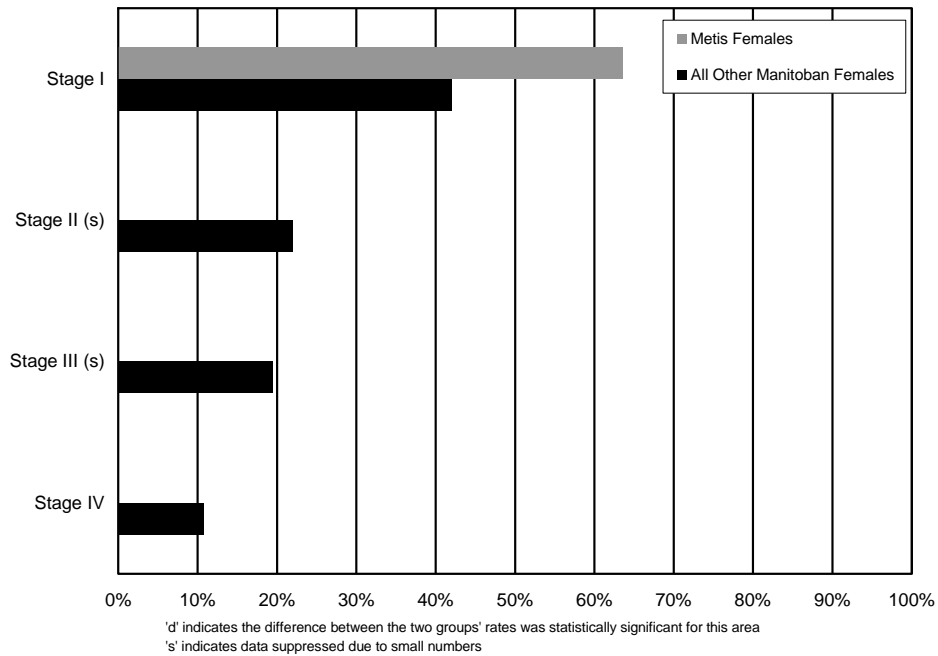
Four-year crude percentages of male residents with prostate cancer



Source: MMF/CCMB, 2010

Figure 9.1.6: Percent of Females with Cervical Cancer by Stage, 2004-2007

Four-year crude percentages of female residents with cervical cancer



Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – *in italics*):

There is no comparable literature on stage at cancer diagnosis for Metis. In our study there were no significant differences between Metis and All Other Manitobans in stage of diagnosis for all invasive, lung, colorectal, breast, prostate, and cervical cancers.

However, the ideal situation is to reduce the percentage of Metis diagnosed with cancer at a late stage – especially Stage IV, when the cancer has spread around the body (metastasized), as this is associated with few treatment options and the poorest prognosis (chance of recovery). Reducing stage for Metis cancer patients is a topic for policymakers' consideration.

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Section 10: Treatment

The most common treatment options for cancer are surgery, radiation, and chemotherapy. Surgery (removing the cancer and any affected tissues) is the most localized form of cancer treatment, followed by radiation therapy (using high-energy rays or particles to kill cancer cells or reduce the size of tumors) and chemotherapy (drug treatments which interfere with the cancer's growth and spread) (Canadian Cancer Society [CCS], 2011; National Cancer Institute, n.d.).

The preferred treatment for a specific individual with cancer depends on many factors, including the type and location of cancer, its size and aggressiveness, the extent of its spread, access to a variety of cancer treatments, the overall health of the individual affected, the results of any previous cancer treatments, and patient choice (CCS, 2011). The goal of cancer treatment is to eliminate the malignant cells from a person's body; if that is not possible, treatments are used to create a better quality of life for the individual by managing the disease's symptoms (Hohenberger, 2002).

Treatment for cancer was measured as a crude percent of all residents with cancer over a ten-year period: 1998-2007. Residents were considered to have had treatment for cancer if they had surgery, radiation, or chemotherapy recorded in the Manitoba Cancer Registry.

The denominator includes all Manitoba residents diagnosed with cancer between January 1, 1998, and December 31, 2007.

10.1 Percent of Individuals Receiving Cancer Treatment

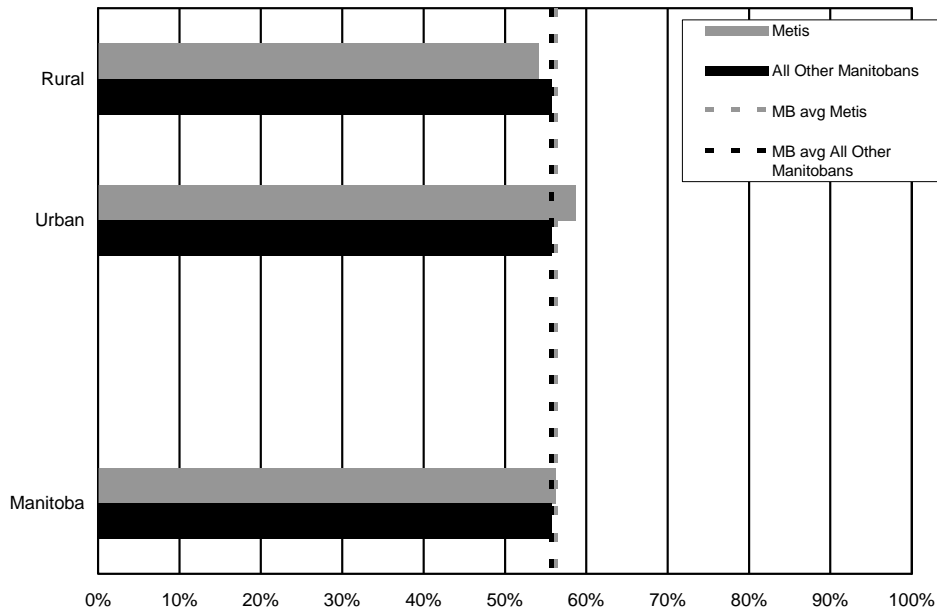
Key observations:

Surgery (with or without other treatments) (Figure 10.1.1)

- There is no difference between the crude rates of surgery (with or without other treatments) in Metis with cancer and All Other Manitobans with cancer at the provincial (56.3% vs. 55.7%) or aggregate levels

Figure 10.1.1: Percent of Patients Who Received Surgery by Region of Residence, 1998-2007

Ten-year crude percentages of residents who received surgery with or without other cancer treatments



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – *in italics*):

Cancer treatment patterns have not been routinely captured for any population until recently. However, as noted by CCMB in the *2010 Community Health Assessment*, treatment rates do not necessarily indicate if individuals with cancer are being treated appropriately (e.g., more treatments are not necessarily better). As noted in that report, there are many factors which contribute to cancer treatment in a specific choice, including the specific diagnosis, cancer stage, the individual's state of health, and the individual's own personal choice (CCMB, 2010).

In Manitoba 54.9% of individuals with all cancers in 2006-2007 received surgery as a cancer treatment (CCMB, 2010).

There is no comparable literature on rates of surgery to treat cancer in Metis. In our study there are no differences between rates of surgery as a cancer treatment in Metis with cancer and All Other Manitobans with cancer at the provincial (56.3% vs. 55.7%) or urban/rural levels.

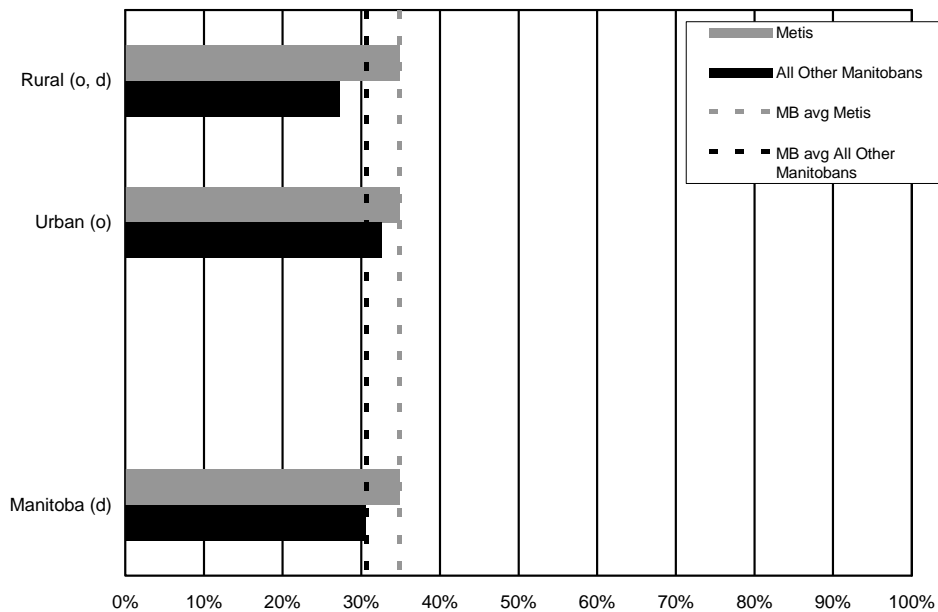
Key observations:

Radiation Therapy (with or without other treatments) (Figure 10.1.2)

- Metis with cancer have a higher crude rate of radiation therapy (with or without other types of treatment) than All Other Manitobans with cancer (34.9% vs. 30.6%) in Manitoba
- Metis with cancer living in rural areas have a higher crude rate of radiation therapy than All Other Manitobans with cancer living in rural areas (35.0% vs. 27.3%)
- All Other Manitobans with cancer living in rural areas have a lower crude rate of radiation therapy compared to their provincial average (27.3% vs. 30.6%) while All Other Manitobans with cancer living in urban areas have a higher crude rate of radiation therapy (32.7% vs. 30.6%) compared to their provincial average

Figure 10.1.2: Percent of Patients Who Received Radiation Therapy by Region of Residence, 1998-2007

Ten-year crude percentages of residents who received radiation therapy with or without other cancer treatments



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – *in italics*):

As noted earlier, cancer treatment patterns have not been routinely captured for any population until recently. However, as noted by CCMB in the *2010 Community Health Assessment*, treatment rates do not necessarily indicate if individuals with cancer are being treated appropriately (e.g., more treatments are not necessarily better). As noted in that report, there are many factors which contribute to cancer treatment in a specific choice, including the specific diagnosis, cancer stage, the individual's state of health, and the individual's own personal choice (CCMB, 2010).

In Manitoba 30.3% of individuals with all cancers in 2005-2006 received radiation treatment (CCMB, 2010).

There is no comparable literature on radiation treatment rates in Metis with cancer. In our study Metis with cancer are statistically more likely to receive radiation therapy (with or without other treatments) both at the provincial level (34.9% vs. 30.6%) and in rural Manitoba (35.0% vs. 27.3%).

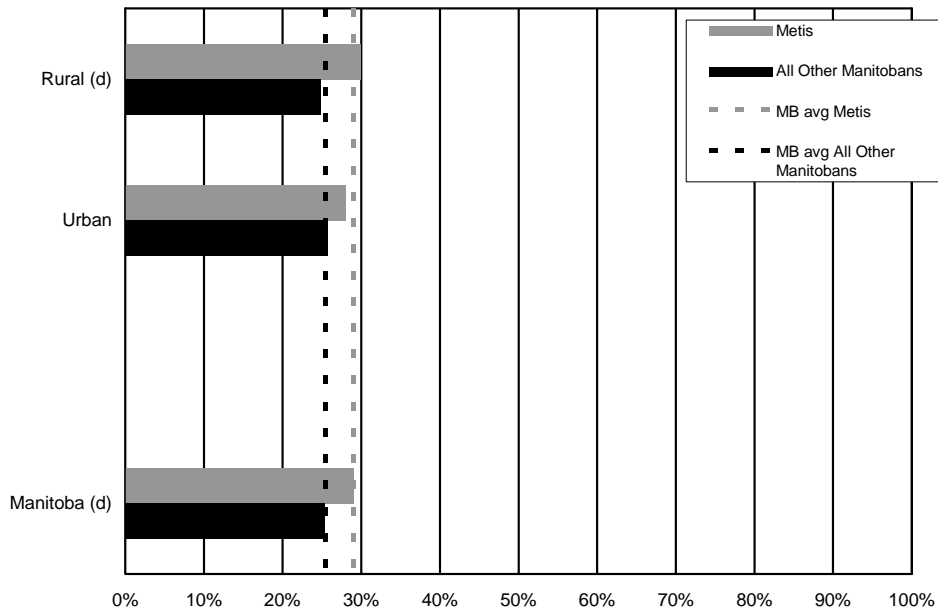
Key observations:

Chemotherapy (with or without other treatments) (Figure 10.1.3)

- Metis with cancer have a higher crude rate of chemotherapy (with or without other types of treatment) compared to All Other Manitobans with cancer (29.0% vs. 25.4%) in Manitoba
- Metis with cancer living in rural areas have a higher crude rate of chemotherapy than All Other Manitobans with cancer living in rural areas (29.9% vs. 24.9%)

Figure 10.1.3: Percent of Patients Who Received Chemotherapy by Region of Residence, 1998-2007

Ten-year crude percentages of residents who received chemotherapy with or without other cancer treatments



'm' indicates the area's rate for Metis was statistically different from the Manitoba average for Metis
 'o' indicates the area's rate for All Other Manitobans was statistically different from the Manitoba average for All Other Manitobans
 'd' indicates the difference between the two groups' rates was statistically significant for this area
 's' indicates data suppressed due to small numbers

Source: MMF/CCMB, 2010

Findings from Literature Review

(compared to the results in this study – *in italics*):

As noted earlier, cancer treatment patterns have not been routinely captured for any population until recently. However, as noted by CCMB in the *2010 Community Health Assessment*, treatment rates do not necessarily indicate if individuals with cancer are being treated appropriately (e.g., more treatments are not necessarily better). As noted in that report, there are many factors which contribute to cancer treatment in a specific choice, including the specific diagnosis, cancer stage, the individual's state of health, and the individual's own personal choice (CCMB, 2010).

In Manitoba 36.0% of individuals with all types of cancer in 2006-2007 received systemic therapy: chemotherapy *or* hormone therapy (CancerCare Manitoba [CCMB], 2010).

There is no comparable literature on rates of chemotherapy in Metis with cancer. In our study Metis with cancer are significantly more likely to receive chemotherapy (with or without other treatments) than All Other Manitobans with cancer both at the provincial level (29.0% vs. 25.4%) and in rural Manitoba (29.9% vs. 24.9%).

10.2 Percent of Individuals with Specific Cancers Receiving Treatment

Key observations:

Crude Percent of Certain Types of Cancers by Type of Treatment, 1998-2007 (Figure 10.2.1 to Figure 10.2.6)

- There are no noticeable differences between types of treatment in Metis with cancer and All Other Manitobans with cancer for all invasive, lung, colorectal, breast, prostate, and cervical cancers (statistical testing was unstable for this indicator due to small numbers)
- All invasive cancers: While not statistically significant, when Metis received surgery as a cancer treatment it tended to be in combination with chemotherapy and/or radiation therapy more often than for All Other Manitobans (27.3% vs. 24.0%)
- Lung cancer: While not statistically significant, Metis with cancer and All Other Manitobans with cancer tended to receive radiation treatment only compared to the next two most common treatments: surgery alone and a chemotherapy/radiation combination (19.4% vs. 17.2% vs. 15.5% for Metis; 20.6% vs. 17.0% vs. 13.9% for All Other Manitobans)
- Colorectal cancer: While not statistically significant, when Metis received surgery for cancer it tended to be in combination with chemotherapy and/or radiation therapy more often than for All Other Manitobans (36.3% vs. 31.3%)
- Breast cancer: While not statistically significant, when Metis females received surgery as a cancer treatment it tended to be in combination with chemotherapy and/or radiation therapy more often than for All Other Manitoban females (74.3% vs. 62.6%)
- Prostate cancer: While not statistically significant, Metis males with cancer tended to have radiation therapy alone more than All Other Manitoban males with cancer (29.8% vs. 22.1%)
- Cervical cancer: While it appears that Metis females tend to have surgery alone as a cancer treatment more often than All Other Manitoban females (40.6% vs. 30.5%), this non-significant difference is likely due to random variation in a very small sample (32 Metis females)

Figure 10.2.1: Percent of Individuals with All Invasive Cancers by Type of Treatment, 1998-2007

Ten-year crude percentages of residents who received various combinations of cancer treatments

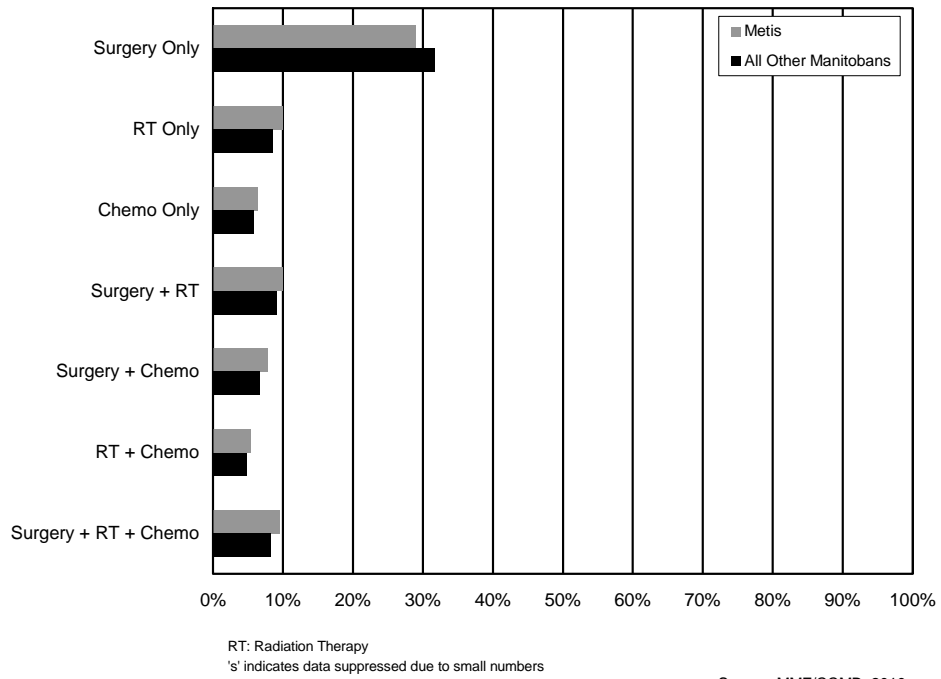


Figure 10.2.2: Percent of Individuals with Lung Cancer by Type of Treatment, 1998-2007

Ten-year crude percentages of residents who received various combinations of cancer treatments

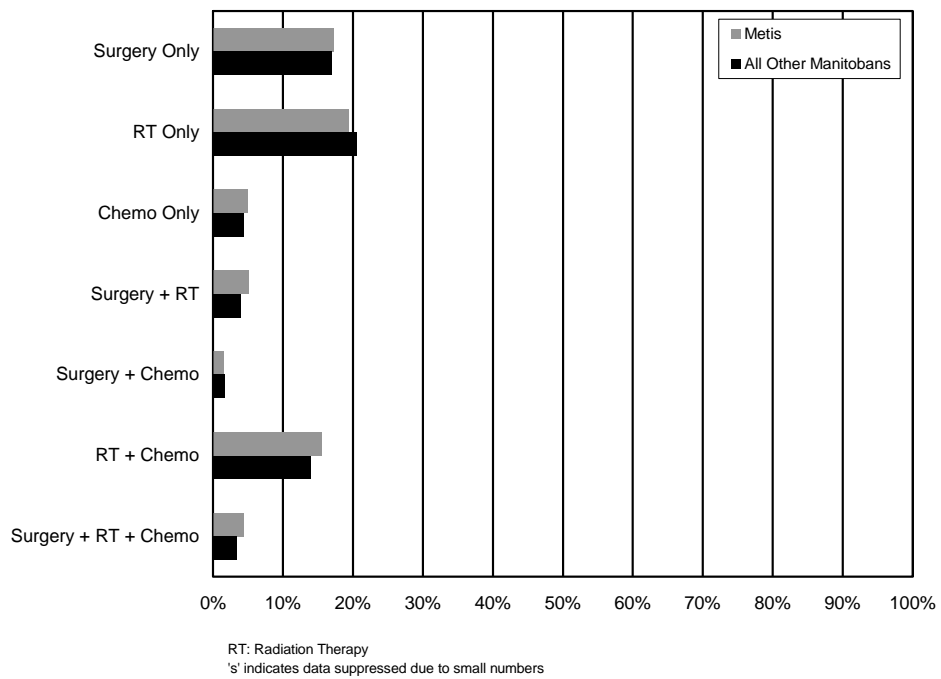


Figure 10.2.3: Percent of Individuals with Colorectal Cancer by Type of Treatment, 1998-2007

Ten-year crude percentages of residents who received various combinations of cancer treatments

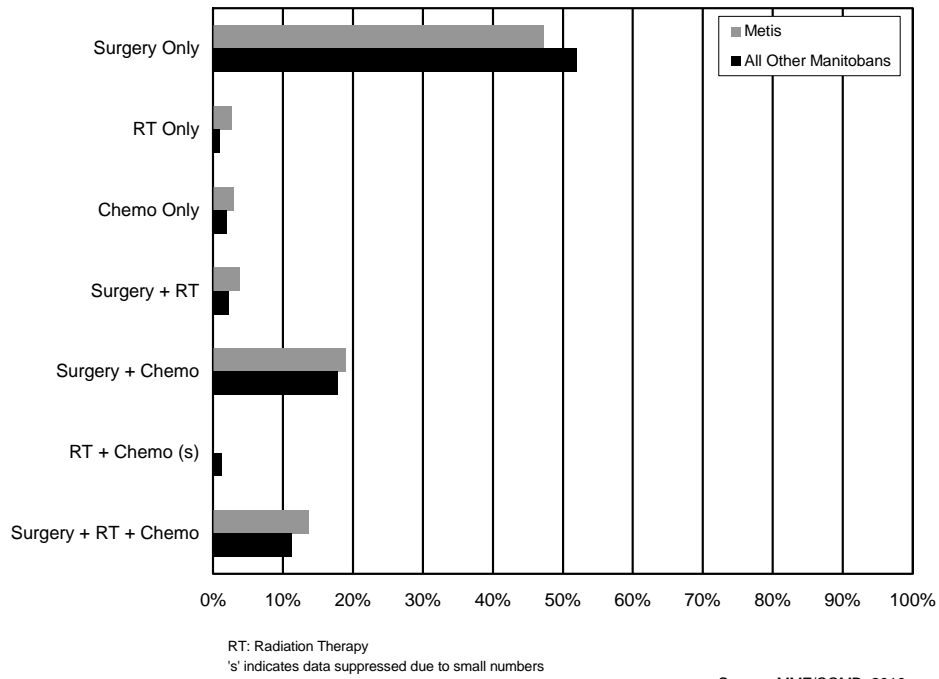


Figure 10.2.4: Percent of Individuals with Breast Cancer by Type of Treatment, 1998-2007

Ten-year crude percentages of residents who received various combinations of cancer treatments

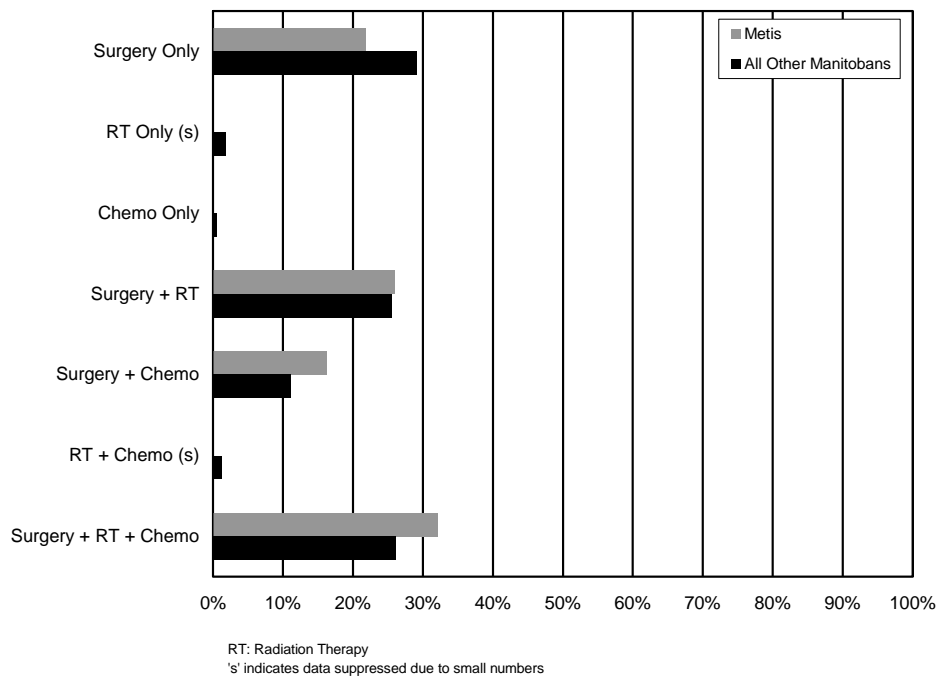


Figure 10.2.5: Percent of Individuals with Prostate Cancer by Type of Treatment, 1998-2007

Ten-year crude percentages of residents who received various combinations of cancer treatments

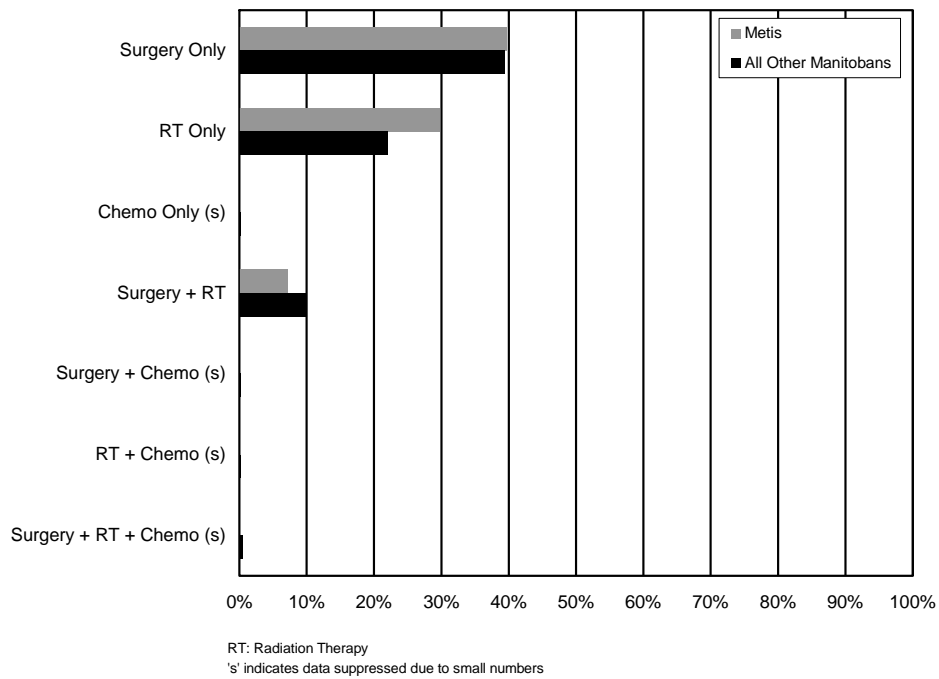
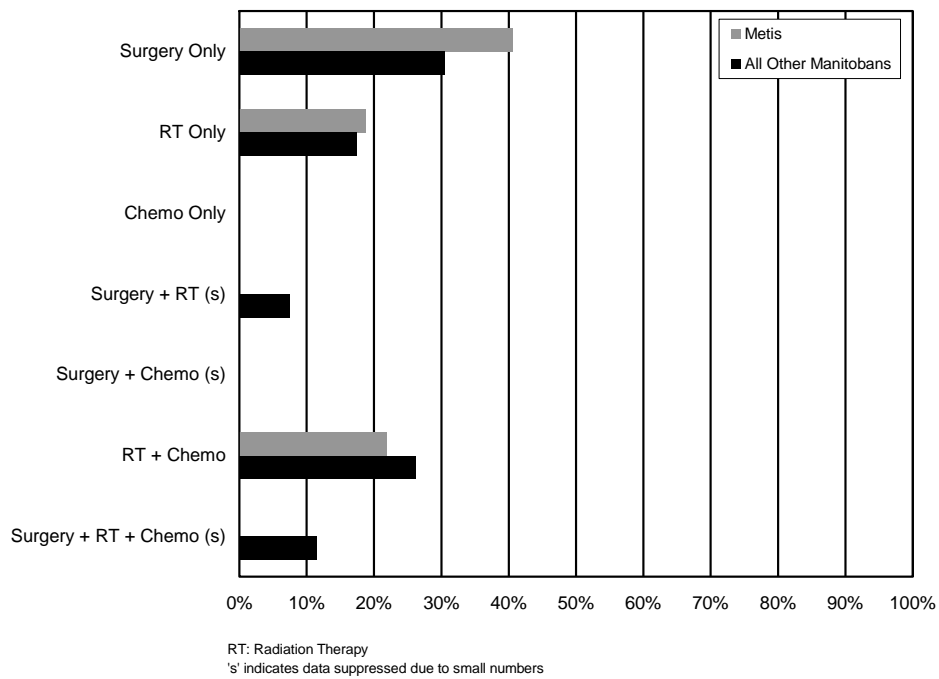


Figure 10.2.6: Percent of Individuals with Cervical Cancer by Type of Treatment, 1998-2007

Ten-year crude percentages of residents who received various combinations of cancer treatments



Findings from Literature Review

(compared to the results in this study – *in italics*):

In Manitoba, the percent of individuals with cancer who received surgery, radiation therapy, or systemic therapy (chemotherapy *or* hormone therapy) has remained fairly constant in the past decade (CCMB, 2010). Most recently in Manitoba, 54.9% of cancer patients underwent surgery as a cancer treatment, 30.3% received radiation therapy, and 36.0% received systemic therapy (chemotherapy *or* hormone therapy) (CCMB, 2010).

Surgery is the most common cancer treatment in Manitoba, though rates vary widely depending on the cancer site, with only 24.4% of patients with lung cancer receiving surgery as a treatment compared to 49.1% of those with prostate cancer, 80.5% of those with colorectal cancer, and 92.1% of those with breast cancer (CCMB, 2010). Systemic therapy is used less often as a cancer treatment in this province, with 25.4% of patients with lung cancer receiving chemotherapy *or* hormonal therapy compared to 30.1% of those with colon cancer, 30.1% of those with prostate cancer, and 74.6% of those with breast cancer (CCMB, 2010). Finally, radiation therapy is used least often as a cancer treatment in Manitoba, with 28.6% of patients with prostate cancer receiving radiation therapy compared to 42.0% of those with rectal cancer, 42.5% of those with lung cancer, and 59.1% of those with breast cancer (CCMB, 2010). These findings underscore the nature of cancer treatment: different treatments are more successful with different types (and stages) of cancer.

There is no comparable literature on treatment rates in Metis with cancer. In our study, while statistical testing was unstable for this indicator due to small numbers, there appear to be some possible (though not statistically significant) trends worth noting. For all invasive cancers, Metis tend to have surgery as a cancer treatment in combination with chemotherapy and/or radiation more often than All Other Manitobans (27.3% vs. 24.0%), while Metis appear to have surgery alone less often than All Other Manitobans (29.0% vs. 31.7%). For lung cancer, both Metis and All Other Manitobans tend to receive radiation alone more than the next two most common treatments: surgery alone and a chemotherapy/radiation combination (19.4% vs. 17.2% vs. 15.5% for Metis; 20.6% vs. 17.0% vs. 13.9% for All Other Manitobans). While not statistically significant, Metis also tend to have surgery as a cancer treatment for colorectal cancer in combination with other treatments more often than All Other Manitobans (36.3% vs. 31.3%), and surgery alone less often than All Other Manitobans (47.2% vs. 52.0%). The same trend appears for breast cancer, where surgery alone is less common in Metis females compared to All Other Manitobans (21.8% vs. 29.1%) than surgery in combination with other treatments (74.3% vs. 62.6%). Finally, Metis with prostate cancer tend to have radiation therapy alone more often than All Other Manitobans with prostate cancer (29.8% vs. 22.1%).

These treatment differences may be due to random variation or to a number of factors specific to each patient's case: clinical details, patient characteristics (including comorbidities and 'fitness' for treatment – meaning they can tolerate the treatment and its side effects), availability and access to treatment, and patient choice. Ensuring access to appropriate cancer treatment for Metis is a significant area for policymakers' consideration.

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Glossary

All Other Manitobans

All Other Manitobans are all individuals living in a geographical area who were not identified as Metis using the Metis Population Database.

Chemotherapy

Chemotherapy is a cancer treatment method involving the use of anti-cancer drugs to kill cancer cells or slow their growth. It is most effective when used to treat forms of cancer that are aggressively growing and spreading to surrounding tissues. Unlike surgery and radiation therapy, chemotherapy is a form of systemic therapy – that is, it affects the whole body (Canadian Cancer Society [CCS], 2011a).

International Classification of Disease (ICD)

The ICD is a classification system of medical diagnoses used internationally by clinicians, health managers, and epidemiologists. It was developed by the World Health Organization as a classification system of diseases, symptoms, injuries, and other health problems (WHO, 2011).

Incidence

Incidence represents the number of cases of cancer newly diagnosed during a defined time period in a specified population. The basic unit of reporting is a cancer rather than a person, as individuals may have more than one type of cancer (Canadian Cancer Society's Steering Committee, 2010).

Manitoba Metis Federation (MMF) Membership

At the MMF, Metis identity is verified by self-identification, Metis ancestry, and community acceptance through membership application and a confirmation process. Through a genealogy with supporting evidentiary documents, an individual and his or her family are able to determine whether or not a Metis ancestral connection can be established. Supporting evidentiary documents many include Federal Census records, sacramental records, Manitoba and Northwest scrip affidavits, post records and journals. All individuals seeking membership in the MMF are required to have a genealogy completed by a recognized institution in order to objectively verify the applicant's historic Metis nation ancestry. Application for membership begins at the receiving local in the area in which an individual resides (Manitoba Metis Federation, 2010).

Metis

The Metis are descendents of early 17th-century relationships between North American Indians and Europeans (Sprague & Frye, 1993). The Metis coalesced into a distinct nation in Manitoba in the late 18th century. After the 1885 fall of Batoche “Metis were denied a separate identity and ignored for a century” (McMillan, 1995, pp.312-313). By 1967, with the formation of the Manitoba Metis Federation, the Metis in Manitoba were again asserting their capacity to advocate and function once more in a collective manner. In the 1982 amendment to the Canadian Constitution Metis were named as one of the three Aboriginal peoples of Canada (Government of Canada, 1982).

Mid

Mid aggregate area is one of three rural aggregate areas in Manitoba. It includes the rural RHAs of central Manitoba: Parkland, Interlake, and North Eastman RHAs (see Figure 1.5.1: Map of Aggregate Geographic Areas).

North

North aggregate area is one of three rural aggregate areas in Manitoba. It includes the rural RHAs of northern Manitoba: Nor-Man, Burntwood, and Churchill RHAs (see Figure 1.5.1: Map of Aggregate Geographic Areas).

Radiation Therapy

Radiation therapy is a cancer treatment method involving the use of high-energy rays or particles to kill cancer cells or reduce the size of tumours. It is generally used before surgery to reduce a tumour's size, following surgery to kill remaining cancer cells, or to relieve pain and control symptoms when recovery is not a likely outcome (CCS, 2011b).

Rural South

Rural South aggregate area is one of three rural aggregate areas in Manitoba. It includes the rural RHAs of southern Manitoba: Assiniboine, Central, and South Eastman RHAs (see Figure 1.5.1: Map of Aggregate Geographic Areas).

Surgery

Surgery is an operation to remove cancer and any affected tissues. It is generally used to remove tumour cells for examination (a biopsy), for staging, or to remove cancer from the body. Surgery is the most localized of cancer treatments, focusing mainly on the immediate cancer site (CCS, 2011c).

Trending

Linear trends were tested using separate contrasts to test for trends in each aggregate area. Only the earliest (1993-1997) and most recent (2003-2007) time periods were compared. Linear trends were calculated comparing the earliest (1993-1997) and most recent (2003-2007) five-year time periods. However, three five-year time periods (1993-1997, 1998-2002, and 2003-2007) are included in the trend charts to provide a more comprehensive view of changing incidence rates over time.

Tumour

A tumour is a mass of cells that may be malignant (cancerous) or benign (non-cancerous) (National Cancer Institute, 2010).

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